

DIGITAL ARCHITECTURE AS A MEANS OF NATURE-BASED THERAPY FOR DISABILITY COMMUNITIES

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Abstract - People with disabilities tend to suffer from mental discomfort. They can lack self-confidence because they have physical limitations. Therapy is needed so that people with disabilities can be more confident in society and social life. Nowadays there are many conventional mental therapies, but they are still not optimal in providing healing, it is necessary to create a new idea or breakthrough that can make therapeutic solutions more effective and enjoyable. The presence of current IT technology can be used as a medicinal solution, one of which is by utilizing virtual reality or VR. VR is a natural reality or an artificial environment that can be designed in such a way that it becomes an environment that is needed according to the target. In VR, it is necessary to design an artificial environment or terrain to be able to provide therapeutic effects based on a calming and comfortable natural environment. Architecture can enter here in the realm of digital architecture, architects can be involved in designing the terrain so that the terrain space can become a room that is optimal for mental therapy. Several studies have shown that using VR technology and architecture (space design) for mental therapy purposes is proven to be effective and, when combined, have a better healing effect than conventional therapy. Based on this understanding, the future must consider VR and Architectural Design as a science in forming effective and efficient mental therapy.

Keywords – disabilities, therapy, virtual reality, architecture, design, terrain

INTRODUCTION

There are around 24,614 people with disabilities in Bali, of which 44% are in the category of people with physical disabilities (losing their limbs). People with dominant physical disabilities receive uncomfortable treatment in blending in in society and have a tendency to close themselves off (Suriaman, 2014). This phenomenon experienced can actually have a psychological and social impact on persons with disabilities in living their daily lives. Therapy is one solution as part of efforts to improve the quality of rights-based services and encourage inclusiveness and potential development for persons with disabilities in every area of life. In accordance with Law Number 8 of 2016 concerning Persons with Disabilities article 5 paragraph (3) b, there are several types of special therapy for persons with disabilities such as physical, mental, spiritual and psychosocial therapy. Concerning the problem of self-closure for persons with disabilities, it can be emphasized that persons with disabilities need a therapy that can optimally heal their physical, mental, spiritual and psychosocial properties. Therapy that can be a solution is therapy by utilizing digital technology. Digital technology that can be a solution is to develop a digital artificial environment that is designed based on the Digital Environmental Architecture design with the parameters needed for therapy. Architectural design or design cannot be separated from digital technology in the architectural world because it can provide progress in the architectural design process (Anantika, 2019) (Maha Putra, 2019) (Putra, 2018) (Mintorogo, 2000) (Nicos, 2000). Advances in

this software-based architectural design process that can be utilized in designing an optimal artificial environment can have a healing impact on people with disabilities (Kalay, 2006)(Kalay, 2004).

Virtual Reality (VR) or Virtual Reality is an artificial digital environment where this environment can be arranged or arranged in such a way as needed. VR-based therapy is an efficient and optimal breakthrough in providing rehabilitation. This therapy process is carried out by entering into virtual reality with the aim of training physically, mentally, spiritually, and psychosocially. Virtual reality is meant here as an environment that is designed or designed in such a way that it can provide a calming atmosphere and effect. The use of virtual reality is a means that can provide in-depth and interactive therapy to build functional skills of persons with disabilities (Berto et al., 2015). Based on previous studies, it can be understood that therapy can be supported by elements of the natural environment to increase the success rate of therapy. This understanding also directs that therapy based on the natural environment can be used for psychological and mental health therapy for people with physical disabilities, which indeed in each of them still tend to be reluctant to appear because they have shortcomings. These problems can be cured by utilizing natural environment-based therapies.

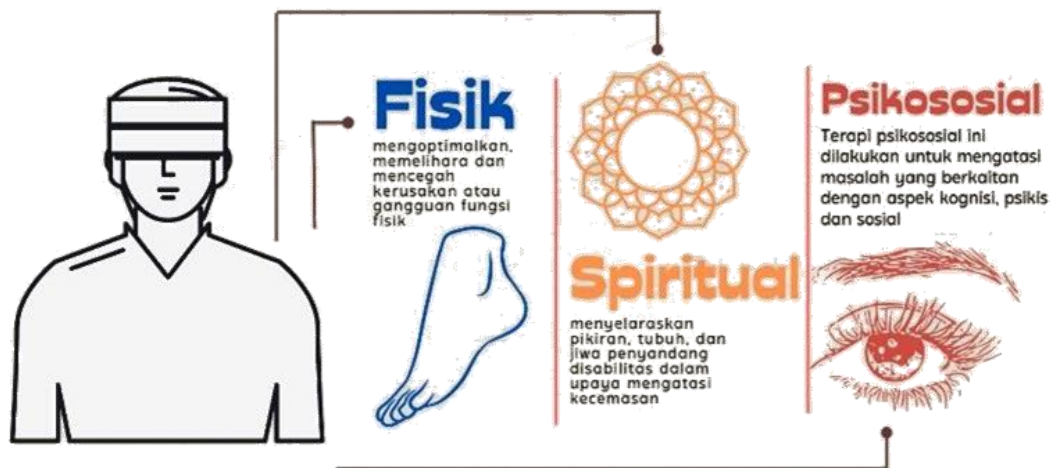


Figure 1: The Concept of the Benefits of VR for Therapy for Persons with Disabilities
Source : Wicaksana, 2022

The use of VR as a therapeutic tool in the last decade has made a positive contribution to the world of health. In several journals, it is stated that VR is used as therapy because of its superiority in simulating nature and interactive social interactions in its effect on the nervous system (Bohil et al., 2011). On the other hand, the use of VR also has the advantage of increasing physical capacity with training modules in the virtual world (Camporesi et al., 2013). Following the previous statement, virtual reality technology in terms of metaverse still has wide development potential. Not only for entertainment purposes, but virtual reality can also be used as a new invention that can contribute to the world of Health. Virtual reality is a digital space that supports therapeutic activities. Virtual reality will be presented in various forms of terrain that can be explored by users. The existence of an immersive environment is intended as a contemplation space for people with disabilities to be in virtual reality and conduct therapy sessions according to their needs. It is hoped that through this virtual reality, it is hoped that persons with disabilities can speed up the rehabilitation process and increase their potential and confidence in carrying out their daily lives.

ARCHITECTURE AS TOOL FOR THERAPY

In its implementation, this design uses several reference literature(Andadari et al., 2021)(Vidiyanti et al., 2020)(Kotnik 2016)(Oxman, 2007)(Hebert, 2003). One of the works of literature used is the concept of "Healing Therapeutic Architecture" or HTA. This concept explains that there are 4 (four) components of the application of the HTA concept that can be applied to buildings to support the

recovery process or psychological healing process for people with disabilities(Kamila, 2019). The four components include (Fadlilah & Lissimia, 2021)(Holowitz, 2012)(Hussein, 2010)(Hosking, 1999):

- 1) Care in Community: a design that can accommodate and increase social interaction. Aspects of circulation, mass, interactive layout of space, and open spaces create a lot of social interaction.
- 2) Design for Domesticity: presenting an atmosphere that is like being at home by utilizing the human scale, white and cream colors, and corridors that are not too long.
- 3) Social Valorisation: presenting a design that can maintain privacy and security.
- 4) Integrated with nature: the principle of maximizing collaboration between buildings and the natural environment

The application of the concept of therapeutic healing is closely related to nature. Because of the close relationship with nature, therapeutic healing can be divided into:

- 1) Horticultural Therapy, this therapy is a farming therapy that aims to be able to enjoy visual beauty and direct contact with plants that can trigger calm, peace, or broadly be able to trigger positive emotions to be able to shift focus from the pain or discomfort experienced by somebody.
- 2) Therapeutic Garden, a therapeutic garden is a form of therapy utilizing an outdoor garden that is designed in detail and specifically for certain users. There are two types of therapeutic gardens, namely active and passive therapeutic gardens. An active Therapeutic Park is a park that is used for activities while a passive therapeutic garden is a park to be enjoyed.

Based on stimulation theory, architecture can have an influence on users through the stimulants presented by processing elements (Ali & Jaya, 2022). According to this theory, architectural design with architectural concepts as therapy made using the frame and sequences method, design built from the user's point of view in the hope that produce a facility that suits the situation. from what has been described previously, architecture is very possible to be used as a means of therapy. Architectural-based therapy facilities can be optimized by designing architecture (buildings, environment, landscape) according to therapeutic needs such as play of shapes, colors, textures, natural elements (trees, shrubs, grass, etc.).

NATURE-BASED THERAPY

Nature-Assisted Therapy (NAT) is a relevant resource for public health. Significant recovery was found for varying outcomes in diagnoses ranging from obesity to schizophrenia. These findings highlight the importance of considering nature as an important resource in mental and community health care and the value of further efforts in research on this subject (Annerstedt & Währborg, 2011). Nature-based therapy is a therapy that is characterized by innovative, experiential (experience-based) that takes place in the natural environment, it requires constant supervision to be able to create a dynamic therapeutic environment and answer current needs (Berger, 2006). Human interest in nature does not only come from the natural elements themselves, but also from the qualities and attributes of nature which people find attractive and aesthetically pleasing, it is seen as a pleasant thing when reproduced in the built environment as well. "Cognitive comfort" can be created in the built environment.

Cognitive comfort resides primarily in the relationship between natural landscape elements of psychological well-being as an aspect of public health. The built environment should not compromise the community's need for psychological recovery because the built environment should contribute to providing opportunities for the physical, cognitive and emotional recovery of its users (Berto et al., 2015). Based on previous studies, it can be understood that therapy can be supported by elements of the natural environment to increase the success rate of therapy. This understanding also directs that therapy based on the natural environment can be used for psychological and mental health therapy for people with physical disabilities who in themselves still tend to be reluctant to appear because they have shortcomings. These problems can be cured by utilizing natural environment-based therapies.

VIRTUAL REALTY-BASED ARCHITECTURAL THERAPY

Computer technology influences changes in communication and expression in architecture. Possible Changes in Communication and Expression in a Technology Supported Architecture based on six computer characteristics: 1) Flexibility - the ability to change the level of abstraction required without having to reconstruct the original representation; 2) Linking -the ability to link information presented in different ways, so when one expression changes, so do the other; 3) Information management – the ability to manage and manage access to complex information sources; 4) Visualization ~Power to imagine~Realistic images without artifacts or environments; 5) Intelligence - the ability to set the design rules, boundaries and goals of the representation itself, Be an active partner in the design process; and

6) Connectivity - the ability to quickly share information among participants in the design process (Aulia Putra, 2018). Based on the above understanding, computers can help realize architecture with very controlled communication and expression so that it can provide visual comfort according to the target it can indirectly control what is seen and felt by someone from an architecture.

An understanding of the characteristics of computers above, explains that computers can help create architectural concepts / architectural designs that are more controlled. With the ability to control the architectural design that is more optimal, then the computer can then be understood as a medium in creating digital architecture with certain goals. The concept of Digital Architecture in question can be presented by designing an artificial environment based on Virtual Realty (VR) as a treatment or therapy solution for people with disabilities who tend to have mental disorders. The use of VR or virtual reality as an effective mental health disorder therapy in treating generalized anxiety disorder and obsessive-compulsive disorder, the use of virtual reality therapy in psychosis, autism spectrum disorders, and attention deficit hyperactivity disorder (ADHD) is promising (Emmelkamp & Meyerbröker, 2021). The results of Virtual Realty (VR) Research before, showed significant differences between patients with gait insecurity on VR and those who used standar therapy, with VR therapy patients showing significant improvements in walking speed and overall mobility In addition, patients who use VR applications show higher motivation (Schalbetter et al., 2022). Based on the studies that have been described previously, Virtual Reality or VR can be called a more effective tool when dealing with mental therapy. The quality of therapy is also largely determined by the design of the artificial environment or terrain that answers the needs of the therapy patient.

Based on the goal of mental healing of people with disabilities, targeted therapy is certainly aimed at mental and psychological healing of people with disabilities. using a nature-based therapeutic approach for persons with disabilities consisting of physical therapy, mental spiritual and psychosocial therapy. The concept can carry the concept of virtual therapy so that users undergo the therapeutic process in an interactive virtual world that has been designed. The Digital Architecture concept presented is designing terrain (artificial digital environment) that allow users (patients) to move freely (walking, sitting, standing, or using a wheelchair) equipped with VR processing facilities. Terrain designs can also be designed so that users not only respond to stimuli from the senses of sight and hearing, but also synergize with the stimuli of the senses of touch and hearing. In the process of carrying out the therapy, users can choose the terrain (artificial environment) or special terrain they want to explore then the VR hardwares will be integrated directly to allow users to actually feel physical interactions in a virtual environment in the form of temperature, wind, water splashes, and others.

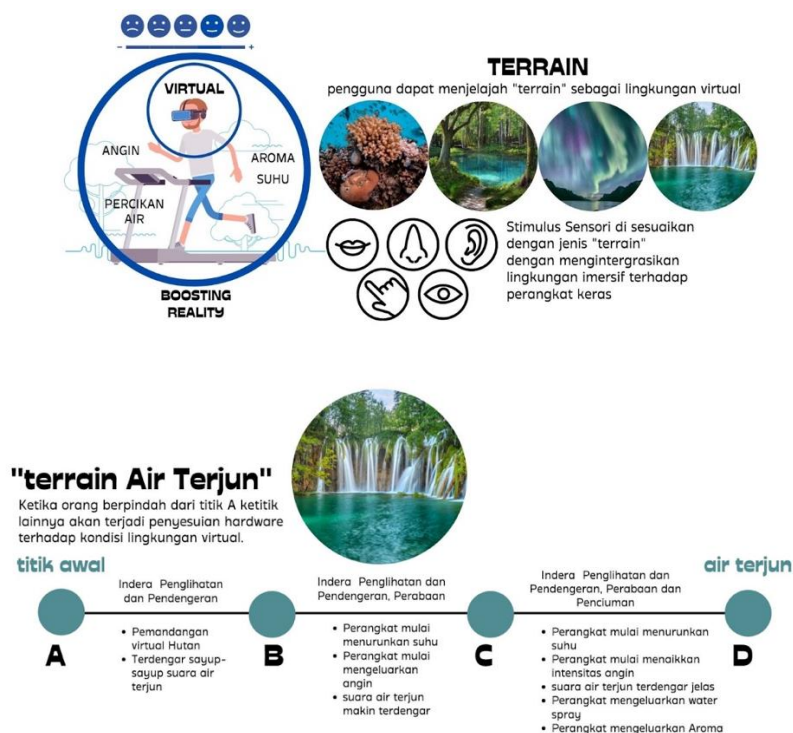


Figure 2: VR utilization scheme in nature-based therapy
 Source : Wicaksana, 2022

As an illustration of the synergistic process between hardware and VR application software, the picture above shows the therapeutic process which also explains how hardware responds to virtual space mechanisms to strengthen the real conditions of the virtual environment. Additional stimuli from the senses of touch and smell become responses that complement the senses of sight and hearing in shaping the perception of immersive space.

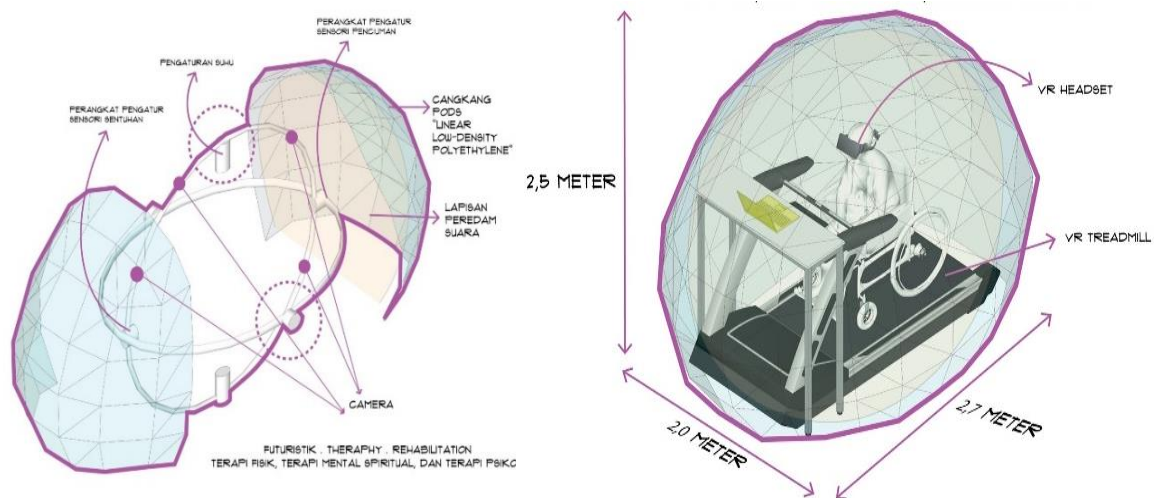


Figure 4: The Concept of the Benefits of VR for Therapy for Persons with Disabilities
Source : Wicaksana, 2022

In the realm of architecture, architects with architectural knowledge need to design realistic artificial environments, by thinking about layout, form, layout, circulation, etc. that can provide a relaxing therapeutic feel.. This VR-based therapy has two main tasks, namely making a design concept of an Virtual Environment so that users can explore it and designing and constructing a therapy room that is able to accommodate the facilities / hardware (hardware) to carry out virtual reality-based therapeutic activities. The main thing about this concept is the ability to design a virtual immersive environment (artificial environment) that can indeed have an effect like being in the wild so that the concept of nature-based therapy, based on digital architecture will be able to be applied optimally.

RESULTS & DISCUSSIONS

The design of the virtual artificial environment as a therapeutic tool must be composed of components of the natural environment that are capable of representing the real natural environment. In designing a virtual artificial environment that might be called a stage, the environmental design must include natural components such as trees, grass, falling leaves, fruits, paths, walking paths, blue skies, and virtual humans that exist in virtual environment. The components used in making the virtual environment must pay attention to the depth of color, and texture that is close to the natural environment in order to be able to have a biological effect on the patient. In addition to playing with the layout of components, textures, and colors, it is also necessary to consider lighting design that is indeed following virtual environmental conditions such as morning sunlight, afternoon sunlight, moonlight, etc.

Light, especially related to the level of intensity that illuminates the virtual environment, also greatly affects the patient's feelings during therapy. Dim light can cause feelings of stress/fear, too bright light will cause discomfort to the eyes, therefore the intensity of light is very important to consider. The psychological state of a person with a physical disability must have been quite depressed mentally. This stressful situation must be considered in the design of the virtual environment so that the virtual environment does not become a means of therapy that worsens rather than heals. The design of the virtual environment by considering the ability to present aspects of the natural environment which is recognized as the most powerful drug for therapy in the virtual environment such as natural components

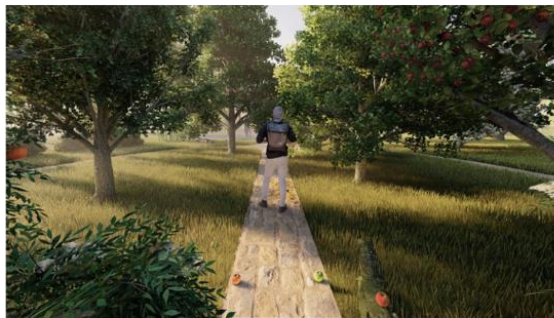
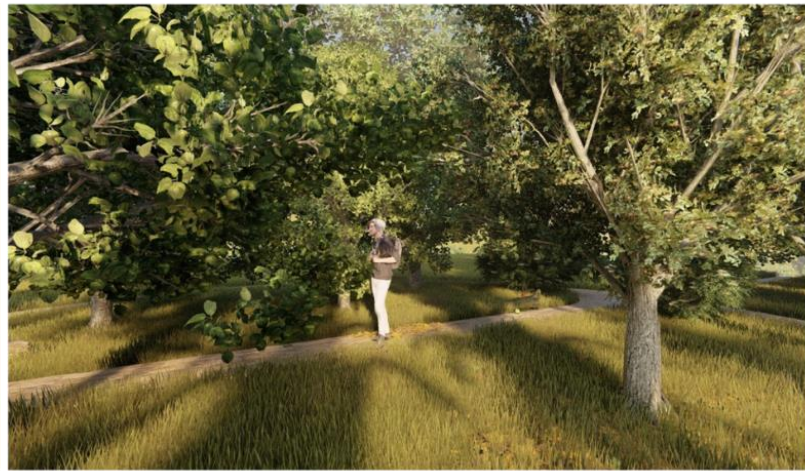
(Trees, Fruits, humans, animals, soil, water, etc.), texture, color depth, the light will certainly be able to produce an optimal virtual environment for mental healing therapy.

Stage VR

Elemen Manusia

Elemen Langit Biru

Elemen Jalur Tracking



Elemen Pohon

Elemen Rumput

Elemen Buah-Buahan

Elemen Jalan Setapak

Figure 5: Virtual Environment Design with Sketchup and Lumion Renderings
Source : Wicaksana, 2022

CONCLUSION

Based on what has been described previously, in the future the field of architectural design can take advantage of the presence of virtual reality (VR) technology to design an artificial or virtual environment that can have specific and controlled goals such as for this therapy. The development of digital technology in the future will undoubtedly provide more opportunities for the development of a more varied digital environment design. The future development of computer hardware and software can also support the design of a digital environment or terrain that is increasingly real or like a natural atmosphere that does exist in the real world. Looking at what can happen in the future and the previous discussion, it can be emphasized that the solution using digital technology as a means of therapy, one of which is VR, is effective and can also be embedded in virtual reality-based games that make therapy patients not like they are doing therapy but they are doing therapy. play. Nowadays, VR is mostly used for games (games), even though VR can be used as a healing/therapy suggestion, which is a more useful use. VR as a therapy suggestion in which an organized and controlled environment is designed will be able to create a patient's mood that is amazed, comfortable, and enjoys the virtual environment so that the terrain can be said to be able to generate positive motivation in each patient with a disability to recover immediately.

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