

Virtual Reality-Based Counseling Innovation for Depression Therapy in the Patient Healing Process

Agus Aan Jiwa Permana^{*1}, I G.M. Surya Bumi Pracasitaram², Hendra Mas Martayana³

¹Department of Informatics, FTK Undiksha, Singaraja, Indonesia

²Department of Industrial Technology Science, FTK Undiksha, Singaraja, Indonesia

³Department of History and Sociology, FHIS Undiksha, Singaraja, Indonesia

e-mail: ^{*1}agus.aan@undiksha.ac.id, ²ipracasitaram@undiksha.ac.id ,

³mas.mertayana@undiksha.ac.id

Abstrak

Depresi merupakan salah satu gangguan mental yang berdampak signifikan terhadap kualitas hidup dan kesejahteraan psikologis pasien, sehingga memerlukan pendekatan terapi yang inovatif. Penelitian ini mengambil fokus pada Inovasi Konseling Berbasis Virtual Reality (VR) karena teknologi VR mampu menghadirkan pengalaman imersif yang interaktif, meningkatkan keterlibatan pasien, serta mendukung proses penyembuhan atau healing. Pendekatan yang digunakan dalam penelitian ini mengaplikasikan metode Rapid Application Development (RAD), dimulai dari identifikasi kebutuhan, desain prototipe, konstruksi sistem, hingga implementasi. Model terapi menghadirkan lingkungan malam yang menenangkan dengan suara alam, serta lingkungan siang yang dilengkapi musik instrumental. Pengujian dilakukan pada 12 responden untuk mengevaluasi tingkat kenyamanan dan UI/UX dengan SUS sebesar 82.08. Hasil pengujian menunjukkan bahwa model diterima dengan baik, memberikan pengalaman konseling yang menyenangkan, serta membantu dalam proses pemulihan. Terapi berbasis VR merupakan alternatif inovatif untuk terapi depresi, memungkinkan pendekatan yang lebih personal, interaktif, dan adaptif, sekaligus memberikan dasar bagi pengembangan teknologi digital dalam praktik psikoterapi modern.

Kata kunci—Virtual Healing, Depresi, RAD, Digital Counselling, Terapi Pasien

Abstract

Depression is a mental disorder that significantly affects patients' quality of life and psychological well-being, necessitating innovative therapeutic approaches. This study focuses on the development of Virtual Reality (VR)-based Counseling Innovation, as VR technology offers immersive and interactive experiences that enhance patient engagement and support the healing process. The research employs the Rapid Application Development (RAD) method, which includes requirement identification, prototype design, system construction, and implementation. The VR therapy model incorporates a calming night environment with natural sounds and a daytime environment accompanied by instrumental music to facilitate relaxation and emotional recovery. Testing was conducted with 12 respondents to evaluate system usability and user interface/user experience (UI/UX), yielding a System Usability Scale (SUS) score of 82.08, indicating high acceptance. The results demonstrate that the VR counseling model provides an enjoyable and effective experience that supports patients' emotional healing. These findings suggest that VR-based counseling can serve as an innovative alternative for depression therapy, offering a personalized, interactive, and adaptive approach. Furthermore, the study provides a foundation for integrating digital technologies into modern psychotherapy practices, highlighting the potential of VR to enhance therapeutic engagement and promote mental health recovery in a controlled, immersive environment.

Keywords—Virtual Healing, Depression, RAD, Digital Counseling, Patient Therapy

1. INTRODUCTION

Mental health has become a growing global concern, particularly following the COVID-19 pandemic, which led to a significant increase in anxiety, depression, and post-traumatic stress disorders. According to the World Health Organization (WHO), over one billion people worldwide experience mental health conditions, yet nearly 75% of them do not receive adequate care, especially in low- and middle-income countries [1].

In Indonesia, the limited number of psychologists and psychiatrists, uneven distribution of mental health services, and social stigma toward mental health issues remain major obstacles in addressing psychological cases [2]. Furthermore, conventional therapeutic approaches still rely on face-to-face meetings, which are not always feasible, particularly for individuals living in remote areas or those with mobility limitations. The advancement of technology, particularly **Virtual Reality (VR)**, offers new opportunities in therapy and counseling. VR enables the simulation of safe, controllable environments tailored to the emotional needs of clients. Previous studies have demonstrated that VR-based therapy is effective in reducing symptoms of PTSD, phobias, social anxiety, and other mental health disorders [3,4].

Nevertheless, the utilization of VR for psychological therapy in Indonesia remains very limited and has not yet been systematically integrated into mental health services. VR can also be applied as a therapeutic tool for individuals with mild to moderate depression, facilitating recovery through a virtual healing process. Due to constraints of time and cost, the healing experience is primarily virtual. This approach is particularly suitable for university students who face heavy academic workloads and semester pressures. The intended benefits of this study include enhancing comfort and engagement in the therapeutic process for student patients. Through a virtual environment, students have the opportunity to express emotions, alleviate psychological stress, and receive positive encouragement to progress through healing stages.

This model provides significant advantages for students experiencing mild to moderate depression within counseling services. First, students can experience counseling in a more interactive, immersive, and enjoyable way, which promotes active participation in each session. The carefully designed virtual environment offers a safe space for students to express their thoughts and emotions without the pressure of direct face-to-face interaction.

Second, the implementation of this model can assist students in managing academic stress, anxiety, and symptoms of mild to moderate depression more effectively. Through the simulations and visual experiences provided by VR, students can learn emotion regulation strategies, relaxation techniques, and coping exercises that support psychological balance. This approach transforms counseling from merely conveying theoretical knowledge into a practical experience that can be applied in real life to improve mental well-being.

Third, for students who are reluctant or face difficulties accessing traditional counseling services, this model offers a more flexible and modern alternative. VR can help reduce the stigma associated with counseling while providing convenient access for those struggling with mild to moderate depression. Consequently, VR-based counseling not only enhances the mental health of students but also strengthens the overall counseling services in higher education institutions, making them more adaptive to the needs of the current generation.

2. METHODS

In this discussion, several methods related to research development will be presented, including a review of relevant literature, types of depression and their management, product development stages using the RAD method, and the development of a product based on Virtual Reality (VR).

2.1 Literature Review

This section will discuss the literature and the urgency of the research. The study is considered highly important for several reasons. First, the gap between the demand for mental health services and access to these services remains significant, particularly in Indonesia [2]. Second, Virtual Reality (VR) technology has been proven effective as a therapeutic tool in various international studies [3,5]. Third, digital transformation in the health sector is a national priority, as outlined in the National Medium-Term Development Plan (RPJMN) 2020–2024 [6]. Virtual Healing has the potential to serve as an innovative, inclusive, and efficient solution to address current challenges in psychological services, especially amid rising suicide rates among adolescents. Furthermore, this study aligns with the Undiksha Research Roadmap in the fields of information technology, education, and health [7].

In this context, it is necessary to develop future technologies that support human safety in the form of virtual healing models. This urgency is highlighted by media reports indicating that Bali has the highest suicide rate among provinces in Indonesia. It is deeply regrettable that many young generations take their own lives amidst the glamour of tourism and the lifestyles admired by many. Adolescent mental health appears fragile, as youths struggle to adapt, feel neglected, and, tragically, some succumb to suicide. According to the Data Center of the Indonesian National Police, in 2023, the suicide rate in Bali was recorded at 3.07 per population, far exceeding rates in Yogyakarta and Bengkulu [8].

Mental health issues have become a growing global concern, including in Indonesia. Disorders such as stress, anxiety, and depression not only affect individuals psychologically but also have social and economic repercussions. One approach increasingly being explored is the use of Virtual Reality (VR) in psychological therapy. VR technology can create immersive environments suitable for exposure therapy simulations, guided meditation, or cognitive training. Research by Wibowo and Sutopo [9] demonstrates that VR-based applications can improve user concentration and reduce anxiety through calming visual and auditory experiences. Various studies have demonstrated the effectiveness of Virtual Reality (VR) in therapeutic contexts. Freeman et al. [10] developed VR therapy for patients with psychotic disorders and found that this approach significantly reduced social paranoia. Similar findings were reported by Maples-Keller et al. [11], emphasizing that VR is not only effective but also provides a more engaging alternative for patients who are reluctant to participate in conventional counseling.

Moreover, VR technology has proven beneficial in trauma recovery and post-disaster stress management. Difede and Hoffman [12] reported the successful application of VR therapy for patients with Post-Traumatic Stress Disorder (PTSD), particularly among attack survivors. This approach has even begun to be adopted clinically in several healthcare systems in the United States and Europe [13]. Research by Slater and Sanchez-Vives [14] highlights VR's potential to foster empathy and enhance psychological well-being. In Indonesia, a study by Pradana [15] indicates that the younger generation shows strong interest in technology-based therapies, including VR, provided that the applications are easily accessible and culturally appropriate.

2.2 Depression and Treatment

Depression is a serious mood disorder characterized by persistent feelings of deep sadness, loss of interest in activities, and decreased energy. It is not merely everyday sadness but a psychological condition that can be triggered by various factors such as severe life stress, traumatic experiences, chemical imbalances in the brain, or family history. The impact of

depression affects not only cognition and emotions but also daily behavior. Symptoms may manifest as a depressed mood, sleep disturbances, changes in appetite, prolonged fatigue, feelings of worthlessness, difficulty concentrating, and even suicidal thoughts.

Treatment of depression generally involves a comprehensive approach that combines multiple intervention methods. Common therapies include psychotherapy to modify negative thinking patterns, the use of antidepressant medications to regulate brain function, and social support to strengthen a sense of meaning. Additionally, healthy lifestyle changes, such as regular exercise and stress management, play a significant role in the recovery process. Technological advancements, including digital counseling that leverages life story analysis, have also emerged as innovative tools for detecting and understanding individual depression and resilience [16].

Depression can be detected through various approaches, utilizing both psychometric instruments and digital technologies. Commonly used instruments include the Depression Anxiety Stress Scale (DASS-21 and DASS-42). The DASS-42 consists of 42 items covering three main dimensions: depression, anxiety, and stress, while the DASS-21 is its shorter version. Respondents rate statements on a Likert scale (0–3), which is then interpreted to determine the severity of depression, ranging from normal to extremely severe [17]. This instrument is widely recognized for its reliability and is frequently employed in psychological and clinical research.

Additionally, analysis of personal narratives or life stories shared on social media can serve as a means to identify depressive symptoms. Using Natural Language Processing (NLP), systems can detect linguistic patterns indicative of psychological conditions such as hopelessness, pessimism, and social withdrawal [16]. Computer vision technology also plays a role by analyzing facial expressions, body posture, and micro-expressions that are difficult to perceive with the naked eye [18]. Text-based conversations through chatbots or digital counseling services can be used to detect early signs of depression by examining language style and word choice [19]. Furthermore, video call assessments allow counselors or multimodal systems to integrate facial expressions, vocal tone, and body language as indicators of depression severity [20]. This multimodal approach is considered more accurate as it combines verbal and nonverbal data in psychological assessment.

Depression is a mental disorder that requires interventions tailored to its severity. For mild depression, interventions typically focus on basic counseling and psychoeducation to help individuals recognize their symptoms. Healing activities such as meditation, light exercise, journaling, and engagement in artistic activities have been shown to reduce stress and improve mood. Technological advancements also enable the use of Virtual Reality (VR)-based virtual healing, such as natural environment simulations with ambient sounds or instrumental music, which can induce relaxation and support emotional balance [3], [5]. For moderate depression, more structured interventions are necessary. Counseling approaches such as Cognitive Behavioral Therapy (CBT) and mindfulness-based therapy are widely applied to modify negative thought patterns and enhance resilience. Group therapy, yoga, or art-based healing activities can strengthen psychosocial aspects. Additionally, virtual healing is increasingly being developed to provide customized simulated environments that support emotional recovery and exposure therapy for specific conditions. At this stage, individuals are also encouraged to have regular consultations with psychologists to ensure targeted symptom monitoring [4], [9].

Severe depression requires intensive professional care. Consultation with psychologists or psychiatrists is essential, and pharmacotherapy with antidepressants may be necessary. Advanced therapies such as CBT, interpersonal therapy, or neuromodulation interventions can also be applied. In this context, virtual healing serves only as a supportive tool to reduce anxiety and enhance relaxation, rather than as the primary therapy. Social support from family and community is crucial to prevent social isolation and ensure the continuity of treatment [2], [10], [13].

2.3 Rapid Application Development (RAD)

The **Rapid Application Development (RAD)** method is a system development approach focused on delivering high-quality applications quickly and efficiently, with relatively low costs [21]. Cost efficiency in this method is achieved through its ability to rapidly adapt to changing requirements. The RAD methodology consists of four main stages: system requirements identification, joint design with users, system construction, and transition from the old system to the new one. During the design and construction stages, the process is carried out iteratively, meaning it is repeated continuously until users feel that the developed system meets their needs and expectations, as illustrated in Figure 3.1.

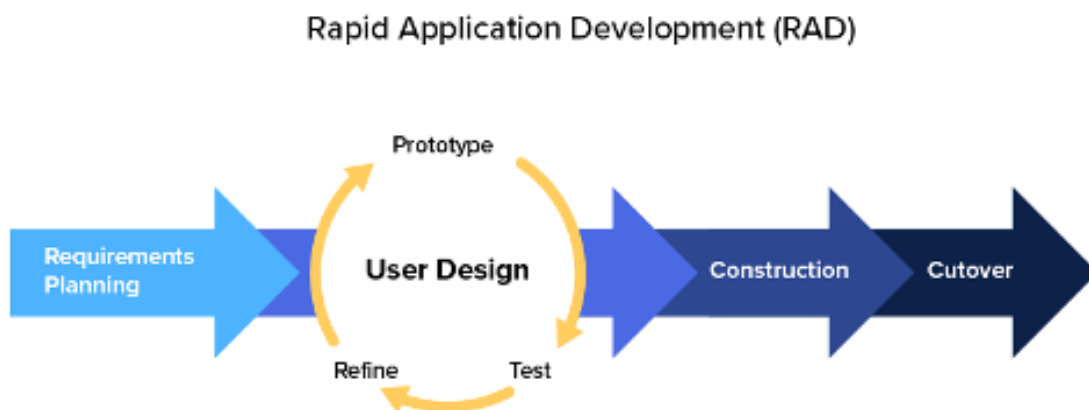


Figure 1 Research Methodology

Rapid Application Development (RAD) is a software development approach that emphasizes rapid prototyping, active user involvement, and repeated iterations until the final system is ready for deployment. This approach is particularly suitable for Virtual Reality (VR)-based counseling research, as it allows continuous validation from both patients and counselors throughout the development process.

Requirement Planning Stage : In this stage, system requirements are identified through discussions with psychologists, counselors, and potential users. The analysis focuses on VR features that support the healing process, such as night-time environments with natural sounds or daytime settings accompanied by instrumental music, as well as the integration of digital counseling features like chat and video calls to facilitate therapeutic interaction.

User Design Stage : An initial VR interface prototype is created and tested with users. Patients and counselors provide feedback regarding visual comfort, navigation within the virtual environment, and therapeutic elements such as relaxation or mindfulness techniques. Iterations are conducted until the design meets therapeutic requirements.

Construction Stage : The VR system is developed based on the approved prototype. The virtual environment is built with comfort-oriented features, harmonious music, and interactive elements for direct patient engagement. Testing is conducted to ensure the system effectively supports depression therapy through realistic healing experiences.

Implementation Stage: The VR system is applied to patients during actual counseling sessions. In this study, students are assessed using psychometric questionnaires such as the DASS-21 to determine depression severity, ranging from mild to severe. Participants with mild and moderate depression are selected for trials of the implemented model. Evaluation is then conducted based on comfort, relaxation, and UI/UX testing, following the process design illustrated in Figure 2.



Figure 2. System Workflow from Real to Virtual

2.4 Development of a Virtual Reality-Based Model

The model development stage begins with the collection of patient data on depression using the Depression, Anxiety, Stress Scale (DASS-21). Two model variations are developed for patients with mild and moderate depression. For mild depression cases, the model features a

night-time environment with a moon, night horizon, and a natural soundscape including crickets, frogs, and grasshoppers, as illustrated in Figure 3. In the case of virtual healing for moderate depression, the daytime theme features a landscape with mountains, grass, a waterfall, and trees, accompanied by a soft piano background, as illustrated in Figure 4.

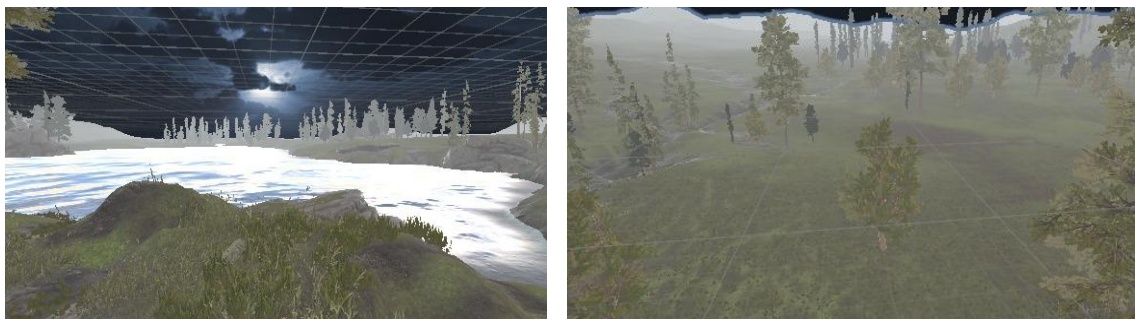


Figure 3. Night Environment Theme

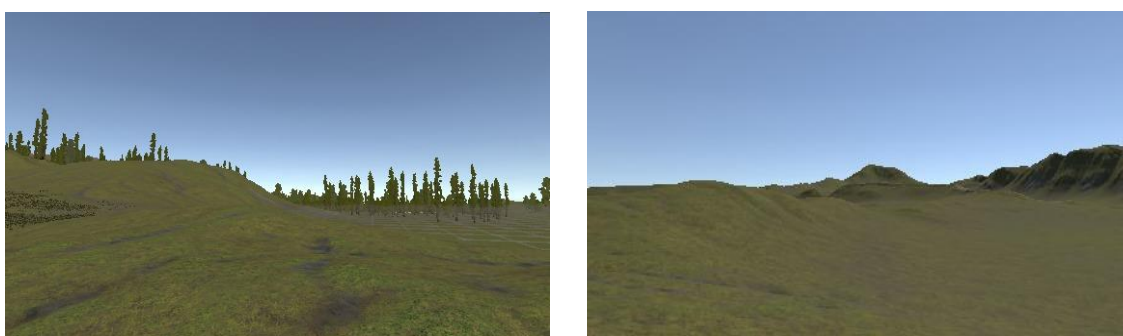


Figure 4 Daytime Environment Theme

The video documentation of the environment can be accessed at the following link:
<https://drive.google.com/file/d/12j6f2vjxcav1ceaghtjbuymefyycefhz/view?Usp=sharing>

3. RESULTS AND DISCUSSION

At this stage, two testing sessions will be conducted on the developed VR healing model. The first test focuses on assessing user comfort levels in terms of the virtual environment and background sound, which will be monitored at regular time intervals.

- User Comfort Testing

This testing phase was conducted through a scenario involving 30 prospective respondents. From this initial pool, 12 participants were selected to take part in the actual experiment. The testing was divided into three phases/days to ensure better focus and achieve more reliable results. In Phase 1 (Day 1), four participants were tested, consisting of two with mild depression (MD) and two with moderate depression (MoD). The outcomes were categorized into several time intervals (2 minutes | 5 minutes | 10 minutes | 15–30 minutes). The results are presented in Table 1. It is important to note that this VR healing model is designed to assist only individuals with mild and moderate depression. In cases of severe depression, students are strongly advised to seek professional treatment from a psychiatrist or mental health specialist. Based on Table 1, the patients' feelings during the test using the virtual reality-based healing

model can be described as presented in Table 2. Documentation of the testing process is shown in Figure 5.

Table 1. Patient Conditions and Testing Phases

Respondents	Depression Condition (Mild/Moderate)	Fase
1	Mild	1
2	Mild	1
3	Moderate	1
4	Moderate	1
5	Mild	2
6	Mild	2
7	Moderate	2
8	Moderate	2
9	Moderate	3
10	Mild	3
11	Mild	3
12	Mild	3



Figure 5 Model Testing Documentation

- User Interface/User Experience Testing
 UI/UX testing is the process of evaluating how users interact with the developed product, namely virtual healing, to ensure that the user interface (UI) is visually accessible and easy to use, while the overall user experience (UX) remains comfortable, efficient, and satisfactory. The main objective is to identify potential issues, understand user behavior, and explore

opportunities for improvement in order to create a successful product. The respondents' data recap is presented in Table 3, and the processing into the System Usability Scale (SUS) is shown in Table 4 using Equation 1.

Table 2 Patient Feelings Per Minute

Resp.	2 Minute	5 Minute	10 Minute	15-30 Minute
1	Comfort	Comfort	Relaxed	Relaxed
2	Comfort	Comfort	Relaxed	Relaxed
3	Comfort	Comfort	Quite Relaxed	Relaxed
4	Uncomfortable	Uncomfortable	Very Relaxe	Very Relaxed
5	Comfort	Comfort	Relaxed	Relaxed
6	Comfort	Comfort	Very Relaxe	Very Relaxed
7	Comfort	Comfort	Relaxed	Quite Relaxed
8	Uncomfortable	Comfort	Relaxed	Quite Relaxed
9	Comfort	Comfort	Quite Relaxed	Relaxed
10	Comfort	Comfort	Quite Relaxed	Relaxed
11	Comfort	Comfort	Relaxed	Relaxed
12	Comfort	Comfort	Very Relaxe	Very Relaxed

Table 3 Summary of Respondent Data (*Q : Question*)

Resp.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	3	2	4	1	3	3	4	1	2	3
2	4	2	5	1	5	3	5	1	4	2
3	3	1	5	3	5	1	5	1	5	4
4	3	1	5	5	5	1	4	3	4	5
5	3	2	4	3	4	2	4	2	4	4
6	5	4	4	5	4	2	4	2	4	4
7	3	3	4	2	3	2	3	2	4	1
8	4	2	3	5	4	3	5	1	5	1
9	3	2	4	3	3	1	4	1	4	3
10	3	4	2	5	4	2	5	3	4	4
11	4	2	4	5	4	2	4	2	3	5
11	4	3	4	5	4	3	4	2	3	5

There are 10 questions on the System Usability Scale (SUS):

Number of Question

1. I think I will use this VR Healing model again.
2. I find this VR Healing model complicated to use.
3. I find this VR Healing model easy to use.
4. I need help from another person or technician to use this VR Healing model.
5. I feel the features of this model work as they should.
6. I feel there are many inconsistencies (not harmonious) in this model.
7. I feel other people will understand how to use this VR Healing model quickly.
8. I find this VR Healing model confusing.
9. I feel there are no obstacles in using this VR Healing model.
10. I need to get used to it before using this model.

There are five answer options for each question, as follows Weight and Description :

1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, 5. Strongly Agree

The study reveals that comfort and usability are the main factors influencing students' acceptance of Virtual Reality (VR)-based Digital Counselling. The virtual night environment with natural sounds and the daytime setting with instrumental music created a relaxing and calming effect, reducing social pressure during counseling sessions. The System Usability Scale (SUS) test produced an average score of 82.08, indicating that the system is easy to use and has an intuitive interface. The combination of emotional comfort and practical usability demonstrates that VR can serve as an effective digital therapy alternative for students with mild depression. The findings imply that interface design should not only focus on functionality but also consider users' emotional and psychological experiences, especially in digital mental health contexts. However, this study is limited by its small sample size of 12 participants and the absence of long-term impact measurements. Future research should involve larger samples, apply longitudinal methods, and integrate emotion or biofeedback.

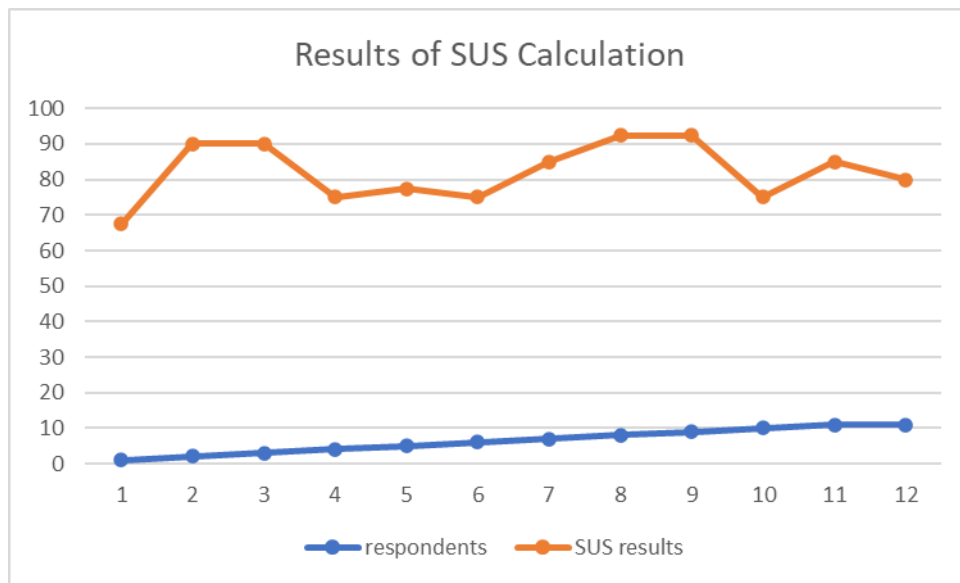


Figure 6 Results of SUS Calculation with Equation 1

$$Total\ Score = \sum_{i=1}^{10} Score_i$$

$$Sehingga\ Skor\ SUS = Total\ Score * 2.5$$

(1)

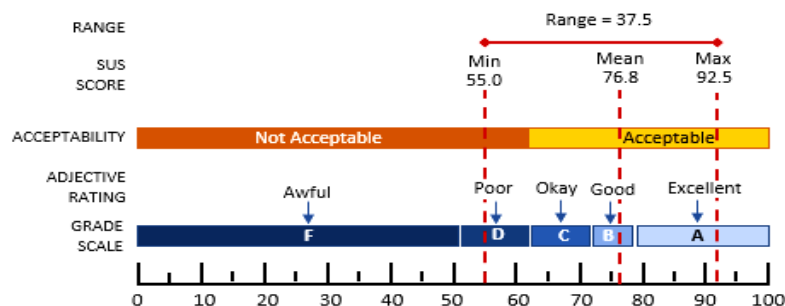


Figure 7 SUS Value Range (Source: https://www.researchgate.net/figure/SUS-Score-and-its-relationship-with-grade-scale-adjective-rating-and-acceptability_fig2_353604363)

The **System Usability Scale (SUS)** is used to assess the usability of a system or application through 10 questions answered by respondents on a 1-to-5 Likert scale, where 1 indicates “strongly disagree” and 5 indicates “strongly agree.” Among these 10 questions, odd-numbered items are considered positive, while even-numbered items are considered negative. To calculate the score for each item, responses to positive questions are adjusted by subtracting 1, whereas responses to negative questions are calculated by subtracting the answer from 5. The scores for all items are then summed to obtain the raw total score. This total is multiplied by 2.5 to convert it to a 0–100 scale, yielding the final SUS score, which represents the system’s overall usability (Equation 1). The level of the value are shown in Figure 7 and summarized in Figure 6 base on Tabel 3, with a final SUS score of 82.08, indicating that the system is well-received with a grade of A (Excellent).

4. CONCLUSIONS

This study provides both scientific and practical contributions to the advancement of modern counseling approaches through the integration of Virtual Reality (VR) into a Digital Counselling model. Unlike conventional face-to-face therapy, which is often constrained by social stigma and accessibility barriers, the proposed VR-based system offers an immersive, safe, and stigma-free therapeutic environment. By incorporating natural night sounds and daytime instrumental music, the virtual settings create a calming atmosphere that promotes emotional balance and user engagement throughout the counseling process. Practically, the findings suggest that VR technology can serve as a viable alternative or complementary tool for counseling services in educational institutions and mental health centers, particularly for individuals hesitant to participate in traditional sessions.

From a scientific perspective, the results highlight the importance of emotional comfort and usability as key determinants of user acceptance in digital mental health interventions. This research broadens the conceptual understanding of how immersive technologies can support more personalized, adaptive, and inclusive therapeutic experiences. However, the study is limited by its small sample size and the absence of long-term effect measurements. Future studies are recommended to involve a larger and more diverse population, employ longitudinal approaches, and explore the integration of physiological sensors or biofeedback systems to enhance the effectiveness, personalization, and reliability of VR-based therapeutic interventions.

ACKNOWLEDGEMENTS

We would like to express our gratitude to LPPM (Institute for Research and Community Service) of Undiksha for providing support and funding for this study, enabling the Social Informatics research group to carry out the research successfully.

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