

IMPACT OF LEAN UX-DRIVEN GAMIFICATION ON THE USABILITY AND EMOTIONAL ENGAGEMENT OF VIRTUAL REALITY THERAPY SYSTEMS FOR EDUCATIONAL COUNSELING

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Abstract

This study investigates the impact of Lean UX-driven gamification on the usability and emotional engagement of virtual reality (VR) therapy systems for educational counselling. A mixed-methods approach was employed, combining usability testing, emotional assessment, and qualitative interviews involving students and school counsellors interacting with a gamified VR therapy system. Quantitative evaluation included task completion rates, System Usability Scale (SUS), Self-Assessment Manikin (SAM), and the Davies-Bouldin Index (DBI) to examine user experience consistency. The results indicate that the integrated Lean UX and gamification approach significantly improved task flow clarity, user satisfaction, emotional engagement, and behavioural coherence compared with a non-gamified VR system. These improvements were attributed to reduced cognitive load through iterative user-centred design and increased motivation through game elements such as feedback, rewards, and progress tracking. The findings highlight the importance of aligning usability engineering with psychological engagement in immersive therapeutic environments. This study contributes a usability-oriented design and evaluation framework for developing intuitive, engaging, and emotionally responsive VR counselling systems in educational contexts.

Keywords: Educational counselling, Gamification, Lean UX, Usability, Virtual reality.

1. Introduction

Virtual reality (VR) has gained increasing attention in educational counselling due to its capacity to create immersive and controlled environments that support emotional regulation, behavioural training, and therapeutic engagement [1, 2]. Many reports regarding virtual-related systems for education have been well-documented [3-7]. VR-based therapy enables students to experience counselling scenarios safely and interactively; however, its effectiveness is frequently constrained by usability challenges, including complex navigation structures, high cognitive load, and inconsistent interaction flows, which may disrupt immersion and reduce therapeutic outcomes [8, 9]. Lean UX offers a user-centred and iterative design approach that emphasizes simplicity, rapid validation, and continuous feedback to minimize cognitive burden and improve interaction clarity [10]. In immersive VR environments, Lean UX has been shown to enhance task efficiency, interface consistency, and overall usability, which are critical for maintaining user focus during therapeutic interactions [9, 11, 12]. Nevertheless, while Lean UX effectively addresses usability-related issues, it does not explicitly target motivational and emotional engagement factors that are essential in educational counselling contexts. Indeed, while counselling system typically use conventional ways [13-16].

Gamification complements this limitation by incorporating motivational elements such as rewards, progress indicators, points, and challenges to enhance user engagement and emotional involvement [17, 18]. Prior studies report that gamified VR systems achieve higher task completion rates, stronger emotional engagement, and improved user satisfaction compared to non-gamified systems [19-22]. However, gamification implemented without a usability-driven framework may introduce feature overload and interaction inconsistency, potentially increasing cognitive load rather than reducing it. Recent research suggests that integrating Lean UX and gamification can improve both usability and engagement in VR-based training and learning environments [11, 23, 24]. Virtual Reality therapy, when supported by this integrated approach, offers significant potential for educational counselling by aligning usability engineering with motivational and emotional design [25, 26]. Nevertheless, studies that apply this combined framework specifically to VR therapy in school-based counselling remain limited, and emotional dimensions are often insufficiently measured or systematically evaluated.

The conceptual integration of Lean UX, gamification, and VR therapy (illustrated in Fig. 1) demonstrates how iterative, user-centred design forms the foundation of system usability, while gamification mechanisms enhance emotional resonance and sustained engagement. This integrated framework supports cohesive user behaviour, predictable interaction patterns, and improved emotional responses during therapeutic interactions. Therefore, this study investigates the impact of Lean UX-driven gamification on the usability and emotional engagement of VR therapy systems for educational counselling. A mixed-methods approach is employed to evaluate task performance, usability, emotional response, and interaction consistency using the System Usability Scale (SUS), Self-Assessment Manikin (SAM), Davies-Bouldin Index (DBI), and qualitative interviews. The novelty of this study lies in: (i) integrating Lean UX and gamification within a VR therapy system specifically designed for educational counselling; (ii) combining

usability and emotional assessment through SUS and SAM; and (iii) applying DBI to evaluate user experience cohesion in immersive therapeutic interactions.

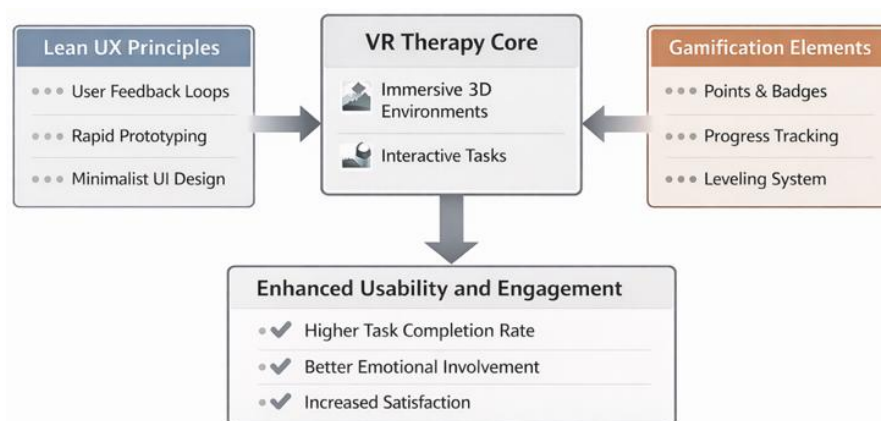


Fig. 1. Conceptual framework of gamified VR therapy design using Lean UX.

2. Methodology

This study used a mixed-methods design to evaluate the effect of Lean UX-driven gamification on the usability and emotional engagement of a VR therapy system for educational counselling. Participants included 80 high school students and 20 counsellors who were randomly assigned to either a gamified VR system (experimental group) or a non-gamified VR system (control group). The research procedure followed four stages, as shown in Fig. 2, including pre-test assessment, VR therapy interaction, post-test evaluation, and interviews. Quantitative data were collected using task completion rates, the SUS, the SAM, and the DBI to measure usability, emotional engagement, and interaction consistency. Statistical analyses were conducted using t-tests and ANOVA, while qualitative interview data were thematically analysed to capture user perceptions and emotional responses during VR-based counselling sessions.

3. Results and Discussion

The results demonstrate that integrating Lean UX-driven gamification significantly improved the usability and emotional engagement of the VR therapy system used for educational counselling. Quantitative findings show that the experimental group achieved a higher task completion rate (92%) compared with the control group (75%), indicating that simplified interaction flow and clear feedback reduced cognitive load and navigation errors. This result aligns with prior findings that user-centred UX design enhances task efficiency in immersive environments [9, 24].

System usability, measured using the SUS, was also higher in the gamified system, with an average score of 4.6 compared to 3.8 in the non-gamified system. These results suggest that Lean UX principles (such as minimalism, iterative refinement, and consistent interaction patterns) effectively improved interface clarity and user satisfaction [10]. The usability improvements are visually supported by the interface components shown in Fig. 3, particularly the streamlined

dashboard and progress indicators. Figures 3(a), 3(b), and 3(c) show the appearance of the system.

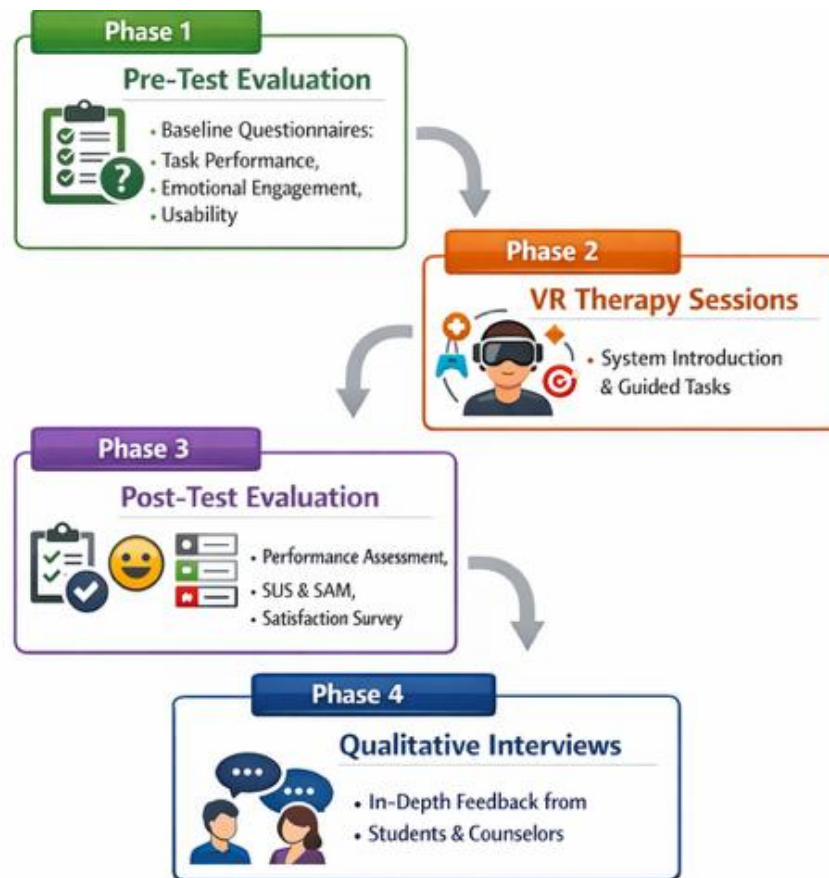


Fig. 2. Flowchart of research procedure.

Emotional engagement analysis using the SAM revealed higher valence and arousal scores in the experimental group (mean score: 7.5) compared to the control group (5.9). This indicates that gamification elements, including points, rewards, and progress tracking, successfully enhanced emotional resonance during therapeutic interaction, supporting previous research on gamification in VR and mental health applications [18, 22, 26].

Behavioural consistency was further examined using the DBI. The experimental group exhibited a lower DBI value (1.23) than the control group (2.75), indicating more cohesive and predictable user interaction patterns. This finding suggests that the combination of Lean UX and gamification not only improved subjective experience but also produced more stable interaction behaviour, reinforcing the importance of usability-driven gamified design in immersive systems.

Qualitative interview data supported the quantitative results. Students reported feeling more motivated, less confused, and more emotionally connected to the therapy tasks when using the gamified system. Counsellors noted that the clear

structure and feedback mechanisms facilitated smoother therapy sessions and better student focus. These perceptions corroborate earlier studies highlighting the role of emotional engagement and clarity in effective VR-based counselling [8, 21].

The results confirm that Lean UX-driven gamification provides a synergistic effect, improving usability, emotional engagement, and interaction consistency in VR therapy systems for educational counselling. This integrated approach addresses both technical usability challenges and psychological engagement needs, offering a practical design framework for future VR-based therapeutic and counselling applications. This adds new information regarding virtual-related applications, as reported elsewhere [27-31].



Fig. 3. Interface Design of the gamified VR therapy system:
 (a) Main dashboard with simplified layout and feedback notifications,
 (b) Reward screen showing points and badges,
 (c) Progress tracker outlining therapy session flow

4. Conclusion

This study demonstrates that integrating Lean UX-driven gamification significantly enhances the usability and emotional engagement of virtual reality therapy systems for educational counselling. The gamified VR system showed higher task completion, improved usability scores, stronger emotional responses, and more consistent interaction patterns compared to a non-gamified system. These improvements resulted from the combination of user-centred iterative design and

motivational game elements that reduced cognitive load while sustaining user engagement. The findings highlight the importance of aligning usability engineering with emotional design in immersive counselling environments and provide practical design guidance for developing intuitive, engaging, and emotionally responsive VR-based counselling systems in educational settings.

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