The use of Virtual Reality Therapy in Ashesi University  
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Cohort A

Table of Contents

[Abstract 4](#_Toc152934341)

[Chapter 1: Introduction 5](#_Toc152934342)

[1.1 Background 5](#_Toc152934343)

[1.2 Motivation 6](#_Toc152934344)

[1.3 Problem Statement 6](#_Toc152934345)

[1.4 Purpose/Objective 7](#_Toc152934346)

[1.5 Research Questions 7](#_Toc152934347)

[1.6 Significance of the Study 7](#_Toc152934348)

[Chapter 2: Literature Review 9](#_Toc152934349)

[2.1 Theoretical review 9](#_Toc152934350)

[2.1.1. Presence Theory 9](#_Toc152934351)

[2.1.2 Technology Acceptance Model 10](#_Toc152934352)

[2.2 Empirical Review 12](#_Toc152934353)

[2.3 Synthesis of Literature Findings 17](#_Toc152934354)

[2.4 Conclusion 18](#_Toc152934355)

[Chapter 3: Methodology 19](#_Toc152934356)

[3.3 Research Philosophy and reasoning approach 19](#_Toc152934357)

[3.4 Research Design 20](#_Toc152934358)

[3.5 Research Scope 20](#_Toc152934359)

[3.6 Instrumentation 21](#_Toc152934360)

[3.7 Data Collection 21](#_Toc152934361)

[3.8 Data Analysis 21](#_Toc152934362)

[3.9 Limitations and Delimitations 22](#_Toc152934363)

[3.10 Validity 22](#_Toc152934364)

[3.11 Ethical considerations 22](#_Toc152934365)

[**References** 23](#_Toc152934366)

Abstract

University students are experiencing increasingly high levels of stress and anxiety. The need for effective stress-reducing and relaxation tools is essential for maintaining the well-being of students. Traditional techniques, such as meditation, can be challenging to adopt consistently, particularly for tertiary institutions like Ashesi University, where the academic load is demanding and rigorous. Therefore, there is a need to incorporate solutions that leverage emerging technologies to provide stress-reducing experiences that are accessible and engaging for Ashesi students to help them destress and maximize their potential during their four-year journey. One such solution is using virtual reality) as a therapeutic tool. According to Jane, De, Jeriko, and Angela (2022), VR can prove helpful in solving pent-up stress. With that in mind, this study aims to explore the use of VR to answer the question: how would using VR as a therapeutic tool for stress management affect Ashesi students’ stress levels?

Keywords: Virtual Reality, Therapy, stress, mental health, Ashesi

# Chapter 1: Introduction

## 1.1 Background

Currently, the world is in a digital age. Millions of people worldwide have access to technology, and it is no different for students in tertiary institutions. There has been an increasing number of students taking notes on a tablet or an iPad during lectures compared to the traditional method of writing notes in a notebook. Group meetings are conducted over online platforms such as Zoom as compared to meeting in a lecture hall. These examples are a few applications of technology in the learning space, and its importance cannot be understated. However, there is one thing that every student faces while in a school setting: stress. Students take to social media to share how stressed they are about school through memes making jokes about dropping out, among others. Although some do so to be entertaining, some are struggling and need help. In the digital age that we are in, technology-focused innovations should be used to help students manage their stress levels effectively whenever they need to prevent burnout. A study on academic stress and mental well-being showed that academic stress strongly correlates with the student’s well-being (Barbayannis et al., 2022). This further iterates the need for structures to be put in place to help Ashesi students navigate their academics and reduce the amount of stress they put on themselves. An example of such technology is virtual reality and, coupled with therapy, brings about the concept of virtual reality therapy.

Virtual Reality (VR) is using computers to model and simulate a 3D environment that a person can interact with (Lowood, 2018). Therapy is a treatment that is meant to relieve or completely heal a person of a disorder. Combining the two definitions, Virtual Reality Therapy (VRT) is the use of computers to model and simulate a 3D environment that a person can interact with to relieve them of a disorder. Virtual Reality has emerged as a groundbreaking method for enhancing mental health and well-being among students. In recent years, universities have started to recognize the potential of VRT as a valuable tool in addressing various psychological challenges students face. In 2021, students at the National Tsing Hua University based in Taiwan created a test platform to help students manage their stress using a VR chatbot. In their research, they indicated that a combination of counselling and VR is a future direction in developing better technology applications (Lin, Trappey, Luan, Trappey, & Tu, 2021).

VRT is a modern approach for treating many stress related diseases. It involves immersing the individual into a tree-dimensional and simulated environments where the individual can see and hear what is real. People act and feel themselves as they would in actual conditions. This is termed as presence (Sarpourian et al., 2022). In psychiatry, VRT has been seen to be effective in treating disorders such as Seasonal Affective Disorder and Stiff-Person Syndrome in children and adolescents (Kim & Kim, 2020). This shows the potential effectiveness of VRT in the medical field.

## 1.2 Motivation

As a computer science major who is interested in technology and psychology, harnessing innovative solutions to support individuals in achieving their life goals is something that the researcher likes to do. The researcher’s fascination with virtual reality (VR) was sparked during student events where such technology was made available for students, leaving the researcher thinking of this technology’s immersive potential. This led the researcher to contemplate how VR, particularly in the context of therapy, could be used to enhance student mental health and well-being within Ashesi.

## 1.3 Problem Statement

Ashesi students are no strangers to the overwhelming stress, anxiety, and mental health challenges often accompanying pursuing higher education. In 2022, 77 percent of college students experienced distress which affected their academic performance (American College Health Association, 2022). Balancing academic pressures, social life, and personal well-being can sometimes be overwhelming. To support students, there are institutions in place to provide supportive services. The Coaching, Counselling, Academic and Peer Support (CCAPS) department in Ashesi seeks to support students academically, socially, and in other ways that students desire. However, sometimes the demand often outweighs the available resources, leading to long waiting times and limited access to support. Recognizing these challenges, it’s clear that we need innovative solutions to enhance the mental health support available on campus.

**Problem Statement:** Virtual Reality Therapy (VRT) has emerged as a promising technology that could potentially revolutionize how we address mental health concerns among university students. Therefore, there is a need to explore ways that this technology can be harnessed to enhance the quality of student life on campus.

## 1.4 Purpose/Objective

The general objective of this study is to determine if using VRT would help students with stress management effectively, ultimately reducing student’s stress levels. The specific objectives of the study are as follows:

1. To gain a comprehensive understanding of the concept of VRT and its applications in the tertiary education context.
2. Evaluate the feasibility of using VRT to help students reduce their stress levels.

## 1.5 Research Questions

The research questions guiding this study are as follows:

1. Does the use of VRT lead to a reduction in stress levels of Ashesi students?
2. How do Ashesi students perceive the effectiveness and usability of VRT?

## 1.6 Significance of the Study

This study can serve as a vital academic resource for researchers, particularly in Ghana, where there is inadequate literature on the use of VRT in tertiary institutions. It can also be used as a foundation for developing or adapting VR-based solutions to help students deal with high stress levels, ultimately contributing to their mental health and overall quality of life. It also paves the way for further research into technology-driven solutions tailored to help tertiary students manage stress.

# Chapter 2: Literature Review

This chapter analyses existing literature on the use of Virtual reality-based methods in therapy and the impact that it has on the human psyche when it comes to stress reduction and the potential role it can play in addressing stress disorders such as Post Traumatic Stress Disorder (PTSD). This literature review aims to review the current literature related to this topic critically, provide an in-depth critique, and identify research gaps that significantly support the relevance of this study.

# 2.1 Theoretical review

## 2.1.1. Presence Theory

Presence theory is an interdisciplinary field composed of psychology, computer science, and communication studies that explores the subjective experience of being physically present in a virtual domain (Biocca, Harms, & Burgoon, 2003). Presence theory is about understanding how experiencing VR brings up feelings in people, influences their behavior and perception towards objects or surroundings.

Presence theory in VR includes spatial presence, that is, having the perception of being in the physical present in the virtual environment. Users’ perception of spatial attributes such as depth, distance, and position lead to an authentic virtual presence. Sensory fidelity, the amount of realism involved in a virtual reality presentation also enhances this perception of spatial presence (Lombard et al., 2015). Visible, auditory, and tactile sensations are instrumental in giving the impression that the virtual world exists and can be experienced by an individual.

Another important aspect of presence theory in VR is social presence; it describes the feeling of being together with other people in this digital environment (Oh, Bailenson, & Welch, 2018). Other virtual entities such as, avatar users or non-playable characters (NPCs) constitute most virtual reality experiences. Such interactions make people feel socially connected and present and therefore create a feeling of co-presence and shared activities. Communication and collaboration also add to social presence making it possible for individuals to interact socially with other users thus establishing good relationships (Oh, Bailenson, & Welch, 2018).

Presence theory in VR encompasses engagement, or the degree of involvement and immersion into the virtual setting. Intensely captivating immersive VR experiences can transpose people out of reality making them deeply involved in it. Interactive components of the virtual environment provide users with more opportunities for influencing the virtual world in which they engage (Shonfeld, Resta, & Yaniv, 2011). The higher presence that is experienced by individuals is associated with a higher level of engagement within the virtual environment.

Presence theory is very important in developing and application VR experience. Understanding the elements that influence presentation will help in forming efficient VR surroundings applicable to therapy.

## 2.1.2 Technology Acceptance Model

TAM deserves special attention among the existing models as it was one of the pioneers in the analysis of user’s behavior in respect of technological innovations. In 1989, the theory of planned behavior was developed, and it provides a simplistic description of those things that motivate personal to adopt new technology. At the heart of the TAM is that two main constructs – the perceived usefulness and the perceived ease of use have great influence on a person’s attitude toward the use of a particular technology. Usefulness means that people perceive whether they will improve their performance or goal achievement by implementing the technology. However, perceived ease of use refers to an individual’s perception that technology will be simple to use and will not involve any difficulties.

TAM argues that individual attitudes concerning technology influenced by perceived usefulness and effortlessness will increase user’s intentions about utilizing the technology (Sagnier, Loup-Escande, Lourdeaux, Thouvenin, & Valléry, 2020). The behavioral intention or an individual’s readiness to adopt a specific technology has been identified as the strongest predictors of actual technology adoption.

Perceived usefulness and perceived ease of use does not work independently: several variables enhance or dilute its effects. Perceived usefulness and ease of use are also affected by factors such as age, education, computer literacy, and previously encountered technologies (Sagnier, Loup-Escande, Lourdeaux, Thouvenin, & Valléry, 2020). Another aspect that affects how someone sees certain technology is social influence such as words said by friends, superiors, or other important people.

Technology acceptance is also determined by the nature of the task that one seeks to accomplish through utilization of the technology. Second, the nature of the task that will be carried out using technology also matters. Individuals are more likely to have a low perceived usefulness but high perceived ease of using when dealing with highly complicated tasks that they do not know in their entirety (Sagnier, Loup-Escande, Lourdeaux, Thouvenin, & Valléry, 2020). On the other hand, in case a task is familiar and well defined, perceived usefulness might be high and perceived ease of use low. Lastly, the intrinsic features encompassing the nature of the technology, such as its capabilities, layout, and intuitive usability, influence how individuals perceive the extent to which they find it easy to employ.

It is worth mentioning that the TAM in its initial form has been extended and refined to cope with the specificity of tech implementation in different social situations. Notable extensions include TAM2 which comprises constructs like subjective norms (perception of peers as to what is expected in term of their behavior towards technology) (Granić & Marangunić, 2019). The third extension of the TAM model is referred to as TAM3 and it enlarges the framework by introducing the perceived enjoyment factor to highlight that the inherent fun one gets from using technologies does also affect adoption related behaviours (Granić & Marangunić, 2019).

Technology acceptance is very crucial in determining how VR based solutions would be adopted into everyday life. This model also helps inform the researcher’s objective in determining the feasibility in using such solutions in a tertiary setting.

## 2.2 Empirical Review

There have been system implementations that have employed VR as the main functionality which has added to the efforts of creating VR based technological solutions to combat stress and provide a sense of relaxation to users.

Heyse et al. (2019) designed a system, VRelax, that uses a semantic approach in analyzing user preferences, personalizing the virtual environment. It allows users to determine the type of virtual environment they want to be immersed in. Over time, VRelax has enhanced its advice to user preferences using online learning methods. This approach is more effective as it caters effectively to user needs rather than providing a centralized virtual world that all users are mandated to experience. By allowing for users to set their preferences, it increases the rate at which such technology would be adopted, and it also provides an avenue for the unique ways that users employ when dealing with stress. The only limitation is that it has not been tested with real world users so its efficacy although it looks promising on paper cannot be truly authenticated.

Lin et al. (2021) designed a test platform for an immersive virtual reality group chatbot counselling system that allows people to seek psychological aid and stress control advice at any time. The research started with a questionnaire administration, measuring stress level and its effect on life. It was designed based on professional psychological counselling knowledge and offered appropriate answers for one-on-one or group counselling sessions in an engaging VR environment. Students can access the platform as avatars and pose questions to the chatbot or have discussions with other students. Such research creates an innovative technological consulting environment for university students, which allows them to remove stress and understand other ways to improve the quality of life of university students. This solution also helps ease the burden on school counsellors and adds to the many alternative methods students have at their disposal when it comes to stress relief.

Lyu (2021) explored the principles of VR treatments pertaining specifically to PTSD. Traditional treatment has also been found to be partly effective for patients with this type of emotional disorder. Nonetheless, they are incapable of creating an isolated and interactive scenario in which the patients learn to fight from their illnesses by repeating that distressful traumatic environment. This capacity comes as a merit when it comes to VR treatment. VR technology allows the recreation of traumatic events to help patients recover from them. It can also be controlled in such a way that the patient’s safety and well-being are ensured. The findings from this research are consistent with the notion that VR treatment has a positive impact on helping patients recover from PTSD and other related stress disorders. This result further supports other scholars’ work where there is an emphasis on the potential benefits VR treatment has to offer. It can also be inferred that VR treatment being effective for stress disorders increases the chances of VR treatments being effective in helping students cope with academic stress.

According to Kemp et al. (2019), nature can play a role in stress reduction. The research investigated the impact of forest-based VR videos on the stress level of college students. In the study, sixty college students were observed as they watched the two-dimensional and virtual reality-based video. Their baseline heart rate variability and electroencephalogram were also compared. Results demonstrated that the forest videos had a positive effect on the physiological stress of the college students. This solution would prove useful to students who take hikes in forests as a form of stress relief, but the location of their college is not near one.

Biber et al. (2020) examined blending Attention Restoration Theory (ART), a theory that suggests that mental fatigue can be improved by spending time in nature or looking at it, and immersive VR as an innovative strategy for minimizing short term work stress. To evaluate this relationship, study participants were shown “micro vacation” i.e., series of real time virtual nature/urban images, when stressed (Biber et al., 2020). The micro-vacations were presented via three different virtual immersive technologies: a VR experience using a headset in a room, a GeoDome (180-degree view screen) experience, and a 2D experience which served as a control. Biometric, subjective mood and comfort data collected from the participants throughout the course of the study measured changes in stress and mood prior to, during and post micro vacation experience. Findings from this study suggested that nature had a positive effect on stress. Also, among the three virtual immersive technologies, the data suggested that participants viewing nature in the GeoDome were the most positively affected. This study is inline with Kemp et al. (2019) whose findings are consistent with nature playing a role in stress reduction.

Rozmi et al. (2020) proposed a design for a virtual reality-based nature therapy app as a possible alternative to relieve stress. Nature therapy, called forest therapy, helps heal people by soaking or staying in a forest environment. Thus, an example of a virtual reality forest therapy simulation is proposed based on this idea. Through forest therapy, users will be able to dip into the forest and feel the therapeutic and relaxing effect that it provides. Design considerations regarding image realism, navigation methods and aids were mentioned for the users’ full immersion into the virtual forest environment and similar experience the forest therapy. Some examples include different types of forests, vegetation and other essential natural factors to help explain them. To present the overall application design, it was applied a gaming concept. A preliminary study showed positive results from the users about the potential applicability of virtual reality in therapeutic interventions. This study also proposes that nature is an avenue for stress relief.

Taneja et al. (2017) explored the efficacy of VR by dividing the participants into two groups for testing: a control group and a stressed group. The Color STROOP task, a psychological experiment where a colour is spelt with a different font colour, which induces stress, was applied to each participant. The participants then underwent a virtual reality (VR) based stress treatment consisting of scenes of nature and a relaxing instrumental music scenario. Findings from this study were consistent with VR being able to reduce mental stress potentially. There is a saying that music is good for the soul, and there might be some element of truth to it. Lin et al. (2020) investigated using music as a potentially effective treatment technique due to its ability to induce harmony and peace in the mind and the body. They presented an idea of creating a virtual realitysystem utilising music therapy known as virtual harmony to alleviate pain, anxiety, and stress. A user can listen to music and play various musical instruments in a three-dimensional environment where real-world panoramic video serves as backdrop scenes. Participants indicated that they enjoyed the system, experienced a lowered level of stress (a 32% decrease), and were relatively calm (Lin et al., 2020)

Lin et al. (2020) proposed a virtual reality (VR) based stress therapy consisting of a typical Malaysian environment in 3D, zikr, an Islamic practice, and soothing music. Comparative studies between VR-based and imaginary techniques were carried out and analysed to determine if the proposed VR-based stress treatment worked. Findings suggested that using VR-based techniques was more effective than the imaginary techniques. This study is one of the first studies that tailors their VR-based solution to cater for a geographic and religious context.

Many interactive games for relaxation have been developed based on virtual reality (VR) in education, particularly in medicine. A study in the Philippines involved 83 college instructors and utilized student respondents to identify domestic sites for relaxation using an application (Jane et al., 2022). They employed a sensor strapped around a player and a skin response sensor attached to them. The stress group demonstrated increased skin resistance, decreased heart rate and weight loss indicators in the game, indicating possible therapeutic usefulness in the Philippines. The findings of this study showed that the application was able to reduce stress levels in participants.

Liu et al. (2023) also proposed an application dubbed “Lullaland”, a virtual reality game that employs wireless diffusers to provide immersive and sensory functionality. Lullaland was created to combat anxiety in high-anxiety spaces such as hospitals. Findings from the pilot study indicate a significant decrease in stress levels among participants. This application can be applied to examination periods where students generally experience anxiety when preparing for examinations.

De Asis et al. (2020) created a mobile virtual reality dubbed “Serenity” to alleviate co-occurring distress among Filipino college students. This application involves seeing nature with peace and harmony through Philippine geography/geographical sites. The system design is based on a traveller in a role-playing game who tours different locations, including sunny and dark scenarios. The skin response sensor readings and oximeter readings were taken during the experiment to determine the participant’s response towards using the virtual reality system. The application was tested on students classified into three different stress groups: low, moderate, or high. The findings are congruent with VR-based solutions capable of reducing stress in individuals.

Tikhonova et al. (2020) explore the potential power of the virtual reality tool Emotional Experience Designer (EED), whose aim is to assist people facing life crises. Thirty-eight participants were involved in this study, and the findings indicated a significant decrease in stress caused by the EED therapy. This tool was adapted to cater to international students needing help navigating their new environments. This tool can also cater to first-year students in tertiary institutions, as the tertiary environment is different from the high school environment, and that difference constitutes a new environment.

Emmelkamp and Meyerbröker (2021) reviewed the use of virtual reality in mental health and why this approach may be relevant in future practices. There is evidence to suggest that virtual reality exposure therapy can be used to treat anxiety disorders and post-traumatic stress disorder. Studies about the use of virtual reality in disorders such as Attention Deficit Hyperactive Disorder (ADHD) show promise.

A study by Eswaran et al. (2018) explored the use of virtual realityTherapy and its impact on students’ mental health. Participants were split into two groups: the control and the stressed group. The control group was administered regular therapy, and the stressed group was administered virtual reality therapy. A quantitative method was used to determine if virtual reality therapy was more effective than regular therapy. The results concluded that there was no significant difference between the two groups. However, there was a decrease in stress levels for both groups, indicating that therapy impacts students’ mental health.

## 2.3 Synthesis of Literature Findings

All literature reviewed explored how the use of VR coupled with therapy has a future standing in society and that further research is needed to fully delve into the possibilities that VRT could have on people’s mental well-being. The most recurring theme was using nature to combat stress, which shows VR’s potent efficacy in simulating immersive nature-based environments, and most studies were quantitative and experiment-based. However, all the study findings, target population, and sample size came from other settings outside Ghana. The target population was mainly focused on the United States and Asian countries, which is a research gap. The researcher hopes to introduce an African context on which other researchers base their work.

Findings from the literature were consistent with the notion that using VRT would positively impact people’s mental well-being. A study where a virtual reality game was built showed that it could reduce stress using skin conductance and heart rate variability as indicators used to measure stress (Jane, De, Jeriko, & Angela, 2022). One study stood out where the findings stated that there was not enough evidence to suggest that VRT positively impacts stress levels (Eswaran, Veezhinathan, Balasubramanian, & Taneja, 2018). Most authors did not highlight the ethical considerations of using VRT during their research, which shows another gap in research about VRT that could be explored.

## 2.4 Conclusion

After analyzing various literature on the role of virtual reality therapy in stress reduction, this literature review concludes that a significant number of studies agreed that virtual reality therapy is effective in reducing stress levels of individuals and has the potential to revolutionize students’ mental health. The benefits of VR therapy, its various applications, and its potential impact on student mental health make it a promising tool for tertiary institutions to adopt and integrate within their support systems. However, there is little to no literature available on the use of virtual reality therapy in the Ghanaian context, specifically, the private tertiary institution Ashesi University, which is the gap this research seeks to address.

# Chapter 3: Methodology

The study examines students’ VR experiences at Ashesi University to understand how its use affects their stress levels and how this gives insight into applications of technology-based solutions in the Ghanaian tertiary setting and beyond. This chapter gives a detailed outline of the processes used to explore this topic. It explores the tools, research methods, and frameworks used to collect and analyse the data used for this research.

**3.1 Objective**

The general objective of this study is to determine if using VRT would help students with stress management effectively, ultimately reducing student’s stress levels. This study would encompass the intricacies of VR and the potential benefits of integrating its use as a wellness tool in the Ashesi community. This research addresses using such tools in an African tertiary setting, specifically the Ghanaian setting, using Ashesi University.

**3.2 Research Questions**

1. Does the use of VRT lead to a reduction in stress levels of Ashesi students?
2. How do Ashesi students perceive the effectiveness and usability of VRT?

These questions will guide the research into the use of VRT in Ashesi University. Their purpose is to capture students’ opinions on VR, highlighting the potential benefits and any concerns that its use could bring.

## 3.3 Research Philosophy and reasoning approach

The study employs an interpretivist research philosophy, delving into students’ subjective experiences with VR. Interpretivism aligns with the aim of comprehending multifaceted meanings that students attribute to their interactions with VRT in the context of stress alleviation. The emphasis is on exploring participants’ lived experiences and perspectives, acknowledging the significance of personal context in shaping their responses (Saunders et al., 2019).

Inductive reasoning will guide this research process, allowing the emergence of insights and theories grounded in the specific observations and experiences of students engaged in VRT. This inductive approach is well-suited to the qualitative nature of the study, facilitating the identification of patterns and themes that may surface from the collected data. By employing inductive reasoning, the study aims to generate contextually relevant knowledge about the potential impact of VRT on students’ stress levels.

## 3.4 Research Design

This study employs a qualitative research design utilizing the case study methodology to comprehensively investigate the integration of Virtual Reality Therapy within the dynamic environment of tertiary education institutions. This approach allows the researcher to delve deeply into the specific case, unravelling the complexities associated with adopting VRT for stress among students (Creswell, 1998). This depth of exploration positions the study to contribute valuable insights that can inform both academic discourse and practical applications of VRT in the higher education landscape. The deliberate alignment with tertiary education settings ensures that findings are contextually relevant, addressing the unique challenges and opportunities presented in this educational context.

## 3.5 Research Scope

The target population for this study is students at Ashesi University. This scope aims to capture diverse experiences and perceptions regarding stress and the potential effectiveness of VRT in addressing these challenges.

This study employs two sampling techniques, namely purposive and stratified sampling. Purpose sampling will ensure that various experiences and perspectives are represented and that students with experience with VR are included. Stratified sampling will ensure representation of students from all year groups, be it undergraduate or graduate level. This approach aligns with the research’s qualitative nature, emphasizing depth over statistical representativeness.

## 3.6 Instrumentation

The primary instruments for data collection will be semi-structured interviews and observations. Semi-structured interviews provide a flexible framework for participants to express their experiences and perceptions of stress and VRT. Observations will complement these insights by capturing non-verbal cues, interactions with VRT, and the overall context in which stress reduction occurs.

Due to the sampling strategy being used, there’s a chance that some students will not have experience with VR, so there will be a VR setup for participants to engage with during the study. This experiential component would help capture authentic reactions and perceptions, contributing valuable context to the qualitative data. It would also support the observational aspect of the study.

## 3.7 Data Collection

The qualitative data collection process will involve semi-structured interviews and observations. Open-ended interview questions will encourage participants to share their thoughts and experiences about stress and VRT. Observations will provide the researcher contextual information on how participants engage with VRT, offering a comprehensive view of their experiences.

## 3.8 Data Analysis

Thematic analysis will be employed as the chosen data analysis method. Thematic analysis involves systematically identifying, organizing, and interpreting patterns and themes within the qualitative data. This iterative process allows for a rigorous examination of the data, ensuring that key insights are extracted and used to build an informed response to the research questions stated in this study.

## 3.9 Limitations and Delimitations

The use of VRT as a wellness tool has not been implemented in Ashesi University before; thus, there is no data to compare the findings of this study to. This limitation makes it challenging to draw comparisons or benchmarks, hindering how the tool’s performance can be assessed and compared with existing methods tailored towards stress reduction in students.

The study deliberately focuses on a specific tertiary education institution in an African country, delimiting the scope of exploring stress reduction through VRT among students. This approach allows for a detailed examination of a particular context.

## 3.10 Validity

The study will employ member checking to enhance the credibility and trustworthiness of the findings. Member checking is the process where participants review and confirm the accuracy of how their data is represented, ensuring that the data collected is in line with their actual experiences (Birt et al., 2016). Also, the interview questions will be standardized to ensure data consistency. Experts in the VR field will also review the questions used in the interview to ensure that they conform to the field.

## 3.11 Ethical considerations

This study will get informed consent from every research project participant and clarify their role in the process. Participants’ confidentiality, as well as their anonymous status, will be observed with high levels of strictness. There will be no consequences for participants who opt out of the study at any time. The researcher will also obtain approval from Ashesi’s ethics board to ensure that all actions involved in the data collection are ethical and will not cause any harm to participants.

**References**

American College Health Association. (2022). American College Health Association-National College Health Assessment III: Undergraduate Student Reference Group Executive Summary Spring 2022. Silver Spring, MD: American College Health Association; 2022.

Barbayannis, G., Bandari, M., Zheng, X., Baquerizo, H., Pecor, K. W., & Ming, X. (2022). Academic Stress and Mental Well-Being in College Students: Correlations, Affected Groups, and COVID-19. *Frontiers in Psychology*, *13*(886344). <https://doi.org/10.3389/fpsyg.2022.886344>

Biber, B., Dodge, M., González, M. L., Huang, R., Johnson, O., Martin, Z., … Barnes, L. E. (2020). *Investigating the Efficacy of Virtual Experiences on Stress Reduction*. <https://doi.org/10.1109/sieds49339.2020.9106637>

Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a More Robust Theory and Measure of Social Presence: Review and Suggested Criteria. *Presence: Teleoperators and Virtual Environments*, *12*(5), 456–480. <https://doi.org/10.1162/105474603322761270>

Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A Tool to Enhance Trustworthiness or Merely a Nod to validation? *Qualitative Health Research*, *26*(13), 1802–1811. https://doi.org/10.1177/1049732316654870

Creswell, J. W. (1998). Qualitative Inquiry and Research Design : Choosing Among Five Traditions. Sage Publications Inc.

De Asis, K. M. R., Guillem, E. J. P., Reyes, F. A. M., & Samonte, M. J. C. (2020). Serenity. *Proceedings of the 2020 the 6th International Conference on Frontiers of Educational Technologies*. <https://doi.org/10.1145/3404709.3404745>

Emmelkamp, P. M. G., & Meyerbröker, K. (2021). Virtual Reality Therapy in Mental Health. *Annual Review of Clinical Psychology*, *17*(1). <https://doi.org/10.1146/annurev-clinpsy-081219-115923>

Eswaran, V. S. B., Veezhinathan, M., Balasubramanian, G., & Taneja, A. (2018). Virtual Reality Therapy for Mental Stress Reduction. *JOURNAL of CLINICAL and DIAGNOSTIC RESEARCH*. <https://doi.org/10.7860/jcdr/2018/36055.12109>

Heyse, J., Thomas De Jonge, Maria Torres Vega, Femke De Backere, & Filip De Turck. (2019). A personalized Virtual Reality Experience for Relaxation Therapy. *Ghent University Academic Bibliography (Ghent University)*. <https://doi.org/10.1109/qomex.2019.8743335>

HOFFMAN, H. G. (2004). VIRTUAL-REALITY THERAPY. *Scientific American*, *291*(2), 58–65. Retrieved from <https://www.jstor.org/stable/26060647>

Jane, M., De, M. R., Jeriko, E., & Angela, F. (2022). *Relieving Stress Through Psychotherapy Using Internet-of-Things and Virtual Reality Game*. <https://doi.org/10.1145/3545897.3545914>

Jo, S.-H., Park, J.-S., & Yeon, P.-S. (2021). The Effect of Forest Video Using Virtual Reality on the Stress Reduction of University Students Focused on C University in Korea. *International Journal of Environmental Research and Public Health*, *18*(23), 12805. <https://doi.org/10.3390/ijerph182312805>

Kemp, A., Palmer, E., & Strelan, P. (2019). A taxonomy of factors affecting attitudes towards educational technologies for use with technology acceptance models. *British Journal of Educational Technology*. <https://doi.org/10.1111/bjet.12833>

Kim, S., & Kim, E. (2020). The Use of Virtual Reality in Psychiatry: A Review. *Journal of the Korean Academy of Child and Adolescent Psychiatry*, *31*(1), 26–32. <https://doi.org/10.5765/jkacap.190037>

Lin, A. P. C., Trappey, C. V., Luan, C.-C., Trappey, A. J. C., & Tu, K. L. K. (2021). A Test Platform for Managing School Stress Using a Virtual Reality Group Chatbot Counseling System. *Applied Sciences*, *11*(19), 9071. <https://doi.org/10.3390/app11199071>

Lin, X., Mahmud, S., Jones, E., Shaker, A., Miskinis, A., Kanan, S., & Kim, J.-H. (2020). Virtual Reality-Based Musical Therapy for Mental Health Management. *2020 10th Annual Computing and Communication Workshop and Conference (CCWC)*. <https://doi.org/10.1109/ccwc47524.2020.9031157>

Liu, B., Wang, W., Zhang, Y., Huang, R., & Raiti, J. (2023). *Lullaland: A Multisensory Virtual Reality Experience to Reduce Stress*. <https://doi.org/10.1145/3544549.3585636>

Lombard, M., Biocca, F., Freeman, J., Ijsselsteijn, W. A., Schaevitz, R. J., & Springerlink (Online Service. (2015). *Immersed in Media: Telepresence Theory, Measurement & Technology*. Cham: Springer International Publishing.

Lowood, H. E. (2018). Virtual reality | computer science. In *Encyclopædia Britannica*. Retrieved from <https://www.britannica.com/technology/virtual-reality>

Lyu, A. (2021). Applications and Future Perspectives of Virtual Reality in the Treatments of Post Traumatic Stress Disorder. *2021 3rd International Conference on Intelligent Medicine and Image Processing*. https://doi.org/10.1145/3468945.3468970

Mahalil, I., Rusli, M. E., Yusof, A. M., Yusof, M. Z. M., & Zainudin, A. R. R. (2014). Virtual reality-based technique for stress therapy. <https://doi.org/10.1109/ICE2T.2014.7006265>

Oh, C. S., Bailenson, J. N., & Welch, G. F. (2018). A systematic review of social presence: Definition, antecedents, and implications. *Frontiers in Robotics and AI*, *5*(114). <https://doi.org/10.3389/frobt.2018.00114>

Sagnier, C., Loup-Escande, E., Lourdeaux, D., Thouvenin, I., & Valléry, G. (2020). User Acceptance of Virtual Reality: An Extended Technology Acceptance Model. *International Journal of Human–Computer Interaction*, *36*(11), 1–15. https://doi.org/10.1080/10447318.2019.1708612

Sarpourian, F., Samad‐Soltani, T., Moulaei, K., & Bahaadinbeigy, K. (2022). The effect of virtual reality therapy and counseling on students’ public speaking anxiety. *Health Science Reports*, *5*(5). https://doi.org/10.1002/hsr2.816

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.

Rozmi, M. D. A., Rambli, D. R. A., Sulaiman, S., Zamin, N., Muhaiyuddin, N. D. M., & Mean, F. O. (2020). Design Considerations for a Virtual Reality-Based Nature Therapy to Release Stress. *2019 International Conference on Advances in the Emerging Computing Technologies (AECT)*. <https://doi.org/10.1109/aect47998.2020.9194175>

Šalkevicius, J., Damaševičius, R., Maskeliunas, R., & Laukienė, I. (2019). Anxiety Level Recognition for Virtual Reality Therapy System Using Physiological Signals. *Electronics*, *8*(9), 1039. <https://doi.org/10.3390/electronics8091039>

Shonfeld, M., Resta, P., & Yaniv, H. (2011, March 7). Engagement and Social Presence in a Virtual Worlds (Second Life) Learning Environment. Retrieved from www.learntechlib.org website: <https://www.learntechlib.org/p/36365/>

Taneja, A., Vishal, S. B., Mahesh, V., & B. Geethanjali. (2017). *Virtual reality based neuro-rehabilitation for mental stress reduction*. <https://doi.org/10.1109/icscn.2017.8085665>

Tikhonova, E., Efremova, G. I., & Terehina, I. (2020). *Virtual Reality as A Tool for Foreign Students’ Anti-Stress Adaptation to A New Educational Environment*. <https://doi.org/10.1145/3416797.3416833>