Digital disruption in the non-profit sector: An analysis of Virtual Reality technology's impact on the donation behaviour of private individuals

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Abstract

In an increasingly digital world, non-profit organisations face the challenge of finding new ways to engage donors for the growing number of social projects. This study examines how Virtual Reality (VR), a new and innovative technology, can positively contribute to fundraising for social causes.

To answer the research question: How and why does the use of Virtual Reality (VR) impact an individual's donation behaviour compared to traditional media?; The donation behaviour of students from Universidade Católica Portuguesa was examined in a lab experiment. The findings revealed that Virtual Reality significantly and positively influenced donation intention and behaviour. The heightened sense of empathy and social presence experienced through VR plays a crucial role in explaining the connection between VR and donation behaviour. Furthermore, Virtual Reality seems to be a powerful tool for enhancing donor engagement through volunteering and money contributions.

Overall, this research sheds light on the effectiveness of VR technology in the fundraising efforts of social organizations. Embracing VR as an innovative approach can revolutionize the strategies employed by non-profit organizations, captivating donors in an increasingly digital landscape and driving support for social causes.

Keywords: Virtual Reality (VR), Donation behaviour, Empathy, Social presence, Non-profit organisations, fundraising

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Sumário

Num mundo cada vez mais digital, as organizações sem fins lucrativos enfrentam o desafio de encontrar novas formas de envolver os doadores no crescente número de projectos sociais. Este estudo analisa a forma como a Realidade Virtual (RV), uma tecnologia nova e inovadora, pode contribuir positivamente para a angariação de fundos para causas sociais.

Para responder à questão de investigação: Como e porque é que a utilização da Realidade Virtual (RV) tem impacto no comportamento de doação de um indivíduo, em comparação com os meios de comunicação tradicionais?; o comportamento de doação de estudantes da Universidade Católica Portuguesa foi examinado numa experiência de laboratório. Os resultados revelaram que a Realidade Virtual influenciou significativa e positivamente a intenção e o comportamento de doação. O elevado sentido de empatia e presença social experimentado através da RV desempenha um papel crucial na explicação da ligação entre a RV e o comportamento de doação. Além disso, a Realidade Virtual parece ser uma ferramenta poderosa para aumentar o envolvimento dos dadores através do voluntariado e das contribuições monetárias.

De um modo geral, esta investigação lança luz sobre a eficácia da tecnologia de RV nos esforços de angariação de fundos das organizações sociais. Adotar a RV como uma abordagem inovadora pode revolucionar as estratégias utilizadas pelas organizações sem fins lucrativos, cativando os doadores num cenário cada vez mais digital e impulsionando o apoio a causas sociais.

Palavras-chave: Realidade Virtual (RV), Comportamento de doação, Empatia, Presença social, Organizações sem fins lucrativos, Angariação de fundos

Título: Disrupção digital no sector não lucrativo: Uma análise do impacto da tecnologia de Realidade Virtual no comportamento de doação dos particulares

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List of abbreviations

ACME	Average Causal Mediation Effect
ADE	Average Direct Effect
AR	Augmented Reality
HMD	Head-mountain Display
IRI	Interpersonal Reactivity Index
NGO	Non-governmental Organisation
NPO	Non-profit Organisation
ROI	Return on Investment
VR	Virtual Reality

Chapter 1: Introduction

1.1 Non-profit organisations

Non-profit organisations are an essential component of society's economic, social, and political fabric, according to Umapathy & Huang (2015). However, unlike for-profit businesses, non-profits focus on creating social value rather than maximising profits and increasing stakeholder wealth, as Richardson et al. (2011) note. Furthermore, non-profits differ from government agencies since they primarily rely on external funding sources, such as donations, grants, and government aid, rather than being funded and controlled by local, state, or federal governments (Gutierrez & Zhang, 2007).

Internationally active non-profits that engage in foreign aid and disaster relief are commonly known as nongovernmental organisations (NGOs). At the same time, welfare associations' member organisations, which operate locally, are characterised as NPOs (Zimmer et al., 2004). However, for the sake of simplicity, this paper will refer to both types of social organisations as non-profits.

Non-profits can be grouped into membership, interest, service, and support organisations (Zimmer et al., 2004). The charitable endeavours of their participants shape membership organisations. Interest organisations, in contrast, advocate for the values and interests of society as a whole or a particular group, like minorities. Service organisations offer services to their customers or a more comprehensive range of clientele. Finally, support organisations offer financial, human, or technical resources to help those in need or to facilitate specific initiatives or activities. According to Zimmer et al. (2004), non-profit organisations are usually "mixed type" organisations out of the abovementioned categories.

Following Casey (2016), the number of non-profit organisations and the competition for donors' discretionary income is growing rapidly worldwide. This competition in the non-profit sector, coupled with the fact that it is increasingly challenging to raise funds required for an organisation's long-term functioning and achieving its mission, has made it difficult to sustain the operations of non-profits (Hommerová & Severová, 2019).

The 2008 economic crisis and the COVID-19 pandemic hit the social sector hard, as charitable donations shrank and foundations suspended grants to protect their endowments (Laforest &

Smith, 2017). However, while crises can have adverse effects, they can also present opportunities for fundraising, growth, and positive change. Therefore, the next chapter will explore trends that arose during the COVID-19 pandemic and benefit income sources.

1.2 Upcoming fundraising trends after Covid-19 pandemic

Globally, the COVID-19 pandemic had a significant effect on non-profit organisations. Following Kristofferson et al. (2022), the epidemic increased the demand for non-profit services. However, traditional fundraising techniques that often represent a considerable proportion of organisational revenue, such as events, were handicapped. Those decreasing donation amounts resulted in uncertainty and instability, which affected these organisations' daily functioning and long-term planning (Marček, 2022).

In response to these challenges, the European Fundraising Association conducted its second multi-lingual, multi-country comparative survey on how the COVID-19 pandemic had affected non-profit organisations and their fundraising efforts (Marček, 2022). In total, 797 non-profit representatives from 26 countries participated in that survey.

According to the findings, two-thirds (67%) of the participating organisations had to postpone funding efforts and events in 2020. The organisations had to find new ways to engage with donors without talking to them. As a result, most organisations (59%) stated that they expanded their use of technology in their funding campaigns. The increase in donation demand and the reduction of volunteers or staff in the organisations, attributed to COVID-19 and other factors, prompted a revaluation (Marček, 2022).

Research has shown that organisations should diversify their income portfolio, especially during times of crisis, to remain financially sustainable as the likelihood of weathering financial difficulties and, most importantly, fulfilling its mission increases (Hung & Hager, 2019). Chang & Tuckman (1994) define a *financially healthy non-profit organisation* as one with diversified revenue sources that provide slack flexibility in the face of a financial downturn.

The advantages of diversification include flexibility, autonomy, income, growth potential, community connection and embeddedness. However, it also has disadvantages, including increased complexity, risk, and mission drift. Mission drift occurs when organisations prioritise financial goals over beneficiaries' needs (Hung & Hager, 2019).

Another crucial aspect to consider is that non-profits should engage with donors, which was particularly hard during COVID-19. Thus, engaging with external stakeholders is one of the

essential elements of sustainable non-profit existence (Hoefer & Twis, 2018). Research showed that deeper engagement leads to donations of cash and time, as well as community support for the mission and vision of an organisation (Hoefer & Twis, 2018; Wedel et al., 2020). In addition, the engagement process ideally leads to commitment, which is critical for a sustainable donor relationship (Hoefer & Twis, 2018).

Research has shown that the market offers technologies to engage with donors, attract new ones, retain old ones, and expand the income portfolio. Among others, Virtual Reality (VR) has shown its potential as several large non-profits leverage the technology for their fundraising efforts (Kristofferson et al., 2022). Grudzewski et al. (2018) describe VR as "a computer based technology that makes it possible to simulate a real environment in which the user can experience the feeling of being present" (p. 36).

The following chapter outlines the existing literature on (a) the concept of Virtual Reality, its inherent characteristics and application in the non-profit sector and (b) the motivations/factors of individuals' donation behaviour. More specifically, the following review sheds light on scholars' evaluation of the influence of Virtual Reality (VR) on donation behaviour. Subsequently, the overarching research question is defined as follows:

RQ1: How and why does the use of Virtual Reality (VR) impact an individual's donation behaviour compared to traditional media?

The research question has been divided into two parts. The "how" component of the question elucidates the primary impact of Virtual Reality (VR), whereas the "why" aspect delves into potential mediators that may influence the link between VR and donation behaviour. To uncover the most critical elements of both parts of the research question, the literature review has been segmented into distinct research objectives, which will be examined individually:

RO1: What is the current state of Virtual Reality (VR) in the non-profit industry?
RO2: What are the central characteristics of Virtual Reality (VR)?
RO3: Which factors may influence an individual's donation behaviour?
RO4: Which variables are affected when utilising Virtual Reality (VR) technology in fundraising?

Chapter 2: Literature review

Given the COVID-19 pandemic, non-profit organisations seek new ways to connect with potential donors and consider new innovative technologies as promising fundraising opportunities (Marček, 2022). The trend to give donors a closer glimpse into their initiatives is evident. Prominent non-profits such as UNICEF and Oxfam are dedicating more funds, personnel, and time to that topic (Kristofferson et al., 2022).

Virtual Reality (VR) has demonstrated its potential in the non-profit sector, inspiring potential supporters to donate. UNICEF's "Clouds over Sidra" project, for example, immersed viewers in a Syrian refugee camp using actual 360° video footage, resulting in a doubling of the donation rate and a 10% increase in volume (Martingano et al., 2022). Global organizations like Amnesty International and the International Rescue Committee have also embraced VR in their fundraising efforts (Martingano et al., 2021).

“Water”, an aid organization dedicated to providing clean drinking water worldwide, invested $100,000 in filming a VR project in Ethiopia (Kristofferson et al., 2022). However, some NGOs have adopted VR fundraising without conducting sufficient research on its effectiveness (Moriuchi & Murdy, 2022), leading to less favourable outcomes. Therefore, understanding the impact of VR on potential supporters' donation behaviour is crucial to determine its worth as an investment (Loureiro et al., 2019).

To investigate VR's influence on potential supporters' donation behaviour, the following chapters present relevant studies and findings that help inform the research question and objectives.

2.1 Virtual Reality

Virtual Reality (VR) has recently gained popularity as more people use it as a communication tool in various contexts (Moriuchi & Murdy, 2022). According to Adams (2016), VR is one of the most promising technological innovations in a business environment. As a result, it has attracted the attention of marketers as a new method of product and brand promotion (Grudzewski et al., 2018).

According to Rosiński (2015), projections indicated a potential increase in active VR users to 39 million in the coming years, with an estimated 28 million users demonstrating a willingness to pay for the available VR content. Between 2017 and 2019, over one million headsets were sold, supporting the trend but not bringing as high sales figures as expected (Statista, 2019). People were anticipating seeing more uses for VR technology in various areas. Smartphone-enabled headgear like Samsung Gear VR and reasonably priced alternatives like Google Cardboard-type devices have become more accessible to the general public (Van Kerrebroeck et al., 2017).

Non-profit marketing is one industry leading the way in utilising VR material (Grudzewski et al., 2018). A few studies already estimate that VR could be a powerful tool for promoting charitable causes and funding (Kristofferson et al., 2022; Martingano et al., 2022; Van Kerrebroeck et al., 2017). For instance, Ahn et al. (2014) discovered that individuals who cut down a tree in VR used 20% fewer paper napkins than those who had just read about deforestation.

The following part aims to enhance the understanding of VR's technological progress and highlight its key features to explore its potential use in social settings. This section also offers insights into the possible factors that VR may influence based on the current literature.

2.1.1 Technological Background

Virtual Reality (VR) enables users to simulate a virtual world and feel present elsewhere (Serrano et al., 2013). To accomplish VR, programmers create a perceivable or manipulatable human-computer environment that can address multiple senses, including kinematic and proprioceptive stimuli, giving a more accurate representation of the domain (Van Kerrebroeck et al., 2017). Mazuryk & Gervautz (1996) divided VR into three categories: desktop VR, fish tank VR, and immersive systems. The first two VR categories are hardly used anymore and are irrelevant to this study. Immersive systems use a head-mounted display (HMD) to create the most realistic experience possible, which can be further manipulated by adding gadgets like joysticks or headphones, data gloves or datasets (Fauville et al., 2020). The HMD, which provides a fully immersive experience with a three-dimensional stereoscopic view, is the device that most VR creators frequently use and which this paper will focus on (Rueda & Lara, 2020).

Big companies that produce VR glasses constantly improve the VR experience to make it as realistic as possible. Technology behemoths like Sony, Google, Facebook, and Samsung jumped into the fray to meet customer expectations and demand. For instance, Facebook introduced the Oculus Rift VR headset, which, among other things, lessened the motion nausea problem that plagued earlier VR systems in 2016 (Kandaurova & Lee, 2019).

As VR develops, it will become more widely used and accessible, opening up countless opportunities for innovation and development (Van Kerrebroeck et al., 2017).To understand how significant those opportunities are and how VR may affect an individual's behaviour, the next chapter will examine the essential characteristics of VR in the following chapter.

2.1.2 Main Characteristics

According to Kandaurova & Lee (2019), Virtual Reality (VR) is a novel, sophisticated form of communication that can alter how people perceive the outside world. Previous research has indicated that VR can affect how people see the world and its behaviour (Martingano et al., 2022). These applications, like 3D product presentations or 360-degree rotation capabilities, have made imagery richer than traditional media and allowed higher levels of *interactivity* and *vividness* (Choi & Taylor, 2014; Coyle & Thorson, 2001; Li et al., 2002). However, it is stated that the perception of interactivity and vividness is a highly subjective experience that varies per person (Grudzewski et al., 2018).

Along with interactivity and vividness, the *immersion* element appears to be an equally important characteristic of VR (Gürerk & Kasulke, 2018). Those elements or attributes that VR can trigger enable non-profit marketers to create captivating experiences that potential donors can view from their homes (Kristofferson et al., 2022).

According to Gürerk & Kasulke (2018) and other literature (Ahn et al., 2014; Coyle & Thorson, 2001; Fortin & Dholakia, 2005), vividness, interactivity, and immersion are the most critical characteristics that VR could evoke. Therefore, the following sections explore the three parts to establish an understanding of the potential impact of VR.

2.1.2.1 Vividness

The latest developments in Virtual Reality (VR) allow users to experience a *vivid* and realistic experience in a three-dimensional virtual world. The authors argue that vividness is one of the

essential elements of VR that can have a favourable emotional impact on users. The authors say that an engaging VR experience is full of visceral details and gives the surroundings a quality of life (Jiang & Benbasat, 2007).
To achieve vividness, VR employs various technological tools such as HMD, hand controllers, stereoscopic sound, and haptic feedback (Fauville et al., 2020). This multisensory feedback is vital in creating a first-person experience that mimics reality, making it feel like the user is in the virtual environment (Fauville et al., 2020).

Kandaurova and Lee (2019) emphasise the importance of visual rhetoric—the optical transmission of information—to further support the notion of vividness in VR. According to the authors, a more realistic virtual environment produces an authentic experience, directly influencing feelings. Strong visuals would elicit feelings that make a user's experience more exciting and unforgettable. Especially in fundraising, the emotional part of VR is crucial and, therefore, creates a promising opportunity (Hommerová & Severová, 2019). For instance, viewers may engage virtually with distant beneficiaries as if they were right there.

VR can offer a lifelike experience that stirs feelings and leaves a lasting imprint through multisensory feedback and full images (Fauville et al., 2020). Thus, the vividness factor of VR could be an essential component that can give the viewer a compelling experience.

2.1.2.2 Interactivity

According to Pimentel et al. (2021), interactivity is crucial in creating engaging Virtual Reality (VR) experiences where users can control and engage with the mediated environment. In simpler terms, it refers to users' influence in changing the VR experience. For instance, interactive features like voice commands and button presses allow users to modify communication content's source, medium, and message (Pimentel et al., 2021).

Several studies have shown that virtual tours, which were more interactive, were able to increase preferences for goods and offers (Eelen et al., 2013; Elder & Krishna, 2012; Shen & Sengupta, 2012). However, according to Spielmann & Mantonakis (2018), interactivity could manipulate that preference change as it increases telepresence, the feeling of being fully present in a virtual environment.

Interactivity is critical to developing engaging and memorable virtual encounters that influence users' attitudes and behaviours. Thus, it is an exciting factor for VR designers and developers to consider, especially when creating environments to influence behaviour positively. Furthermore, providing users with more control and interaction opportunities can make VR experiences more immersive and impactful (Coyle & Thorson, 2001).

2.1.2.3 Immersion

The degree of immersion has recently been augmented with Virtual Reality's (VR) technological advancements. According to Fauville et al. (2020), when individuals immerse themselves in VR, they feel like they are actively participating and part of the environment. That degree of immersion can be achieved because the technology provides constant stimuli and experiences that make users feel present in the virtual environment (Gürerk & Kasulke, 2018).

One factor contributing to the level of immersion in VR is the degree of realism presented in the VR rendering system, as it collects lots of sensory input (Wedel et al., 2020). In addition, thanks to technological advancements, VR encounters are more sensory-rich, giving viewers a more lifelike and immersive experience. According to Wedel et al. (2020), the increased sensory data in VR encounters has improved engagement and reality.
The authors propose that the immersion level of a media device is determined by the quantity and quality of sensory information it provides to the user. As technology improves and develops, VR experiences will likely become even more realistic and immersive, further blurring the line between reality and the virtual world.

2.1.3 Conclusion

In conclusion, Virtual Reality (VR) has become increasingly popular as a communication tool and has caught the attention of marketers as a new way to promote products and brands. As VR technology develops, it will become more widely used and accessible, opening up countless opportunities for innovation and development.
The non-profit marketing industry is leading the way in using VR to promote charitable causes and funding (Grudzewski et al., 2018). However, there are concerns about its effectiveness in fundraising efforts, and scientific studies on VR's effectiveness as an instrument for social marketing are rare. Vividness, interactivity, and immersion seem to be the essential

characteristics of VR, which can alter how people perceive the outside world and their behaviour.

2.2 Donation Behaviour

According to the literature, various variables and motivators shape the complex phenomenon of *donation behaviour*. However, fundamentally, donation behaviour supports a specific cause, group, or person by donating money, time, or other resources (Kandaurova & Lee, 2019).
According to Hommerová & Severová (2019), public, private, and individual support are the three main kinds of donations. Considering the research question, the following chapter will only refer to private donations.

Bekkers & Wiepking (2011) mention in their paper that people donate for many reasons, such as altruism, cost and benefits, awareness of need, personal values, reputation, or religious convictions. Furthermore, giving can take many forms, including one-time or ongoing contributions, donations made in person or online, and gifts of cash or in-kind (Bekkers & Wiepking, 2011).

Organisations comprehending the factors and reasons influencing donation behaviour may plan effective fundraising campaigns and have a more significant impact (Yoo & Drumwright, 2018). To pursue this assumption, the following chapters will examine a typical contribution process, reasons for giving, elements that affect giving, different kinds of donations, and how Virtual Reality might improve donating in the context of non-profit organisations.

2.2.1 Donation Process

A donation process usually starts by choosing a non-profit organisation that fits the donor's values and purpose. As a next step, donors are asked to make a one-time financial gift or schedule regular donations (Wasik, 2013). Typically, supporters donate their one-time or recurring donations via the non-profit's website, postal mail, or smartphone app. According to a study, 62% of donors worldwide prefer to donate via online platforms (Yoo & Drumwright, 2018).
After a contribution, the non-profit typically sends donors a receipt with a "thank you" note. In the best case, donors receive follow-up communications from that organisation with updates on how the association will use their contribution and to attract them in the long run. For that

purpose, donors usually get asked for their contact information within their contribution process to send updates on activities and potential donation possibilities (Kenang & Gosal, 2021).

An essential component of non-profit fundraising and its donation process is attracting and retaining supporters, which requires the continuing enhancement and streamlining of the contribution process (Csongrádi et al., 2018). Therefore, non-profits frequently use marketing and outreach initiatives to attract new contributors and retain loyal ones (Xu et al., 2021). Thus, they must ensure a user-friendly and secure donation process to earn donors' confidence.
The following chapter discusses underlying factors and reasons non-profits should be aware of when attracting and keeping donors.

2.2.2 Motivations and Factors influencing donation behaviour

When it comes to charitable giving, people are motivated by a variety of factors. As mentioned before, altruism is one of the most common reasons for giving, defined as a desire to help others and positively impact the world. Cost and benefits are another motivation, where individuals consider the cost and benefits of donating to determine whether it is worthwhile. Additionally, people may give because of an awareness of a specific need, personal values, reputation, or religious convictions (Bekkers & Wiepking, 2011).

Robiady et al. (2021) found in their research on the influence of storytelling in crowdfunding that direct storytelling impacted customer engagement and donation likelihood. Besides storytelling, guilt was considered as another factor influencing charitable giving, as studies have shown that when individuals feel existential guilt, they may attempt to alleviate it by donating to a charity (Eayrs & Ellis, 1990; Hibbert et al., 2007). However, other research has already suggested that unified guilt appeals may be less effective, and there may be no relationship between guilt and charitable donation intentions (Lwin & Phau, 2014).

2.2.3 Conclusion

In conclusion, although everyone has a different reason for contributing to charity, several things can influence someone's propensity to give. The standard process of donating usually begins with an individual selecting an organisation that aligns with their values and supports the social causes they believe in. However, non-profit organisations must establish a sustainable relationship with donors and encourage repeat donations while retaining existing ones.

Therefore, various factors affecting donation behaviour must be considered to facilitate the optimal connection between donors and non-profits.
The following chapter will discuss the relationship between VR and donation behaviour, based on the given insights and further literature, to get insights into how VR can potentially impact the mentioned factors from this chapter.

2.3 Relationship between Virtual Reality and donation behaviour

Virtual Reality (VR), which has become increasingly popular in recent years, could positively influence individuals' social behaviour, according to Fauville et al. (2020). This phenomenon is particularly evident in charitable donations, as Kristofferson et al. (2022) found that VR generated significantly higher contributions when compared to tablet advertisements.
It is stated in some studies that engaging potential donors in creative activities like VR Tours may positively influence donation behaviours (Hoefer & Twis, 2018; Xu et al., 2021). Interestingly, even if the activities are unrelated to the charity's leading cause or the charitable organisation itself, participating in them impacted the probability of donations and the amount donated. One reason for that phenomenon could be that participating in interactive activities increases participants' liberty, which may encourage more unusual giving behaviour (Xu et al., 2021). This effect would emphasise how crucial it is to involve people—physically or mentally—in tasks requiring them to create something new to promote better donation behaviour.

Next to the investigation in the social sector, numerous studies analysed the impact of VR on general human behaviour. One such study was conducted by Van Kerrebroeck et al. (2017), examining how VR affected brand association and marketing messaging. First, they found that users' perceptions of vividness were significantly affected by VR. Additionally, they hypothesised that the feeling of *social presence*—a perception of being present in a setting other than one's physical location—might mediate the relationship between VR and purchase intention. Similarly, Martínez-Navarro et al. (2019) investigated how VR affected consumer behaviour in general and discovered that the feeling of being social presence could explain the correlation.

Another variable that is influenced by VR and may affect donation behaviour is *empathy* since Martingano et al. (2021) investigated the effect of VR on empathy and discovered a correlation

between emotional empathy and VR exposure. According to the literature, empathy is defined as the ability to understand how other people feel (Martingano et al., 2021).
Rueda & Lara (2020) argue that VR is an "empathy machine" because it enables users to experience anything directly from another person's perspective (p. 2). In addition, Moriuchi & Murdy (2022) found that VR increases empathy, positively affecting prosocial behaviour. Therefore, it can be assumed that empathy mediates the relationship between VR and donation behaviour.

Based on the presented literature, investigating how VR affects giving behaviour while using *empathy* and *social presence* as mediators would be intriguing. Knowing how these two variables interact would be significant, given that they impacted the relationship between VR and donation behaviour in previous studies. To gain further background knowledge on the two mediation variables, the following chapters will explore them further.

2.3.1 Empathy

Empathy is a complex ability that involves various psychological processes, including understanding and sharing the internal emotional states of other individuals, regardless of their species (Rueda & Lara, 2020). Some scholars compare empathy to a muscle that can be trained, grow, and regenerate over time (Konrath et al., 2011). Furthermore, empathy is essential in building social connections (Ventura et al., 2020).

According to the literature, empathy consists of two major categories: cognitive and emotional empathy (Ventura et al., 2020). Cognitive empathy enables objectively understanding another person's emotions and mental state. In contrast, emotional empathy is a subjective experience where an individual feels and shares another's emotions (Ventura et al., 2020). Emotional empathy is fast and automatic; even babies show this response when witnessing another person's suffering (Neumann & Strack, 2000). However, with age, cognitive empathy becomes a more complex mentalising ability that demands focus and effort to understand others' thoughts and emotions (Gweon & Saxe, 2013).

An interesting finding was made in the literature that vividness, a central characteristic of VR, may significantly impact empathy (Monzel et al., 2023). People can better visualise and relate to the experiences of others when information is given vividly and engagingly, which, on the other hand, could heighten their sentiments of empathy. In addition, vividness can increase the

salience and recollection of other people's experiences, increasing emotional resonance and comprehension (Monzel et al., 2023).

Martingano et al. (2021) argue that VR can foster empathy by immersing individuals in situations where they can experience what it is like to be in someone else's shoes. One of the strengths of VR is that it removes the cognitive burden generally associated with perspective-taking (Ahn et al., 2013). For instance, Schittek Janda et al. (2004) discovered that dental students who received instruction in a virtual setting and engaged with virtual patients displayed greater empathy for their real-world patients than those who did not.

Furthermore, researchers have determined that empathy plays a crucial role in prosocial behaviour, which includes giving to charity (Baumeister et al., 2007; Jolliffe & Farrington, 2006; Kandaurova & Lee, 2019). According to Decety & Svetlova (2012), cognitive and emotional empathy increased prosocial behaviours, such as donating time and money. On the other hand, Martingano et al. (2021) only assume that there is a link between VR and emotional empathy because VR demands mental exertion. Herrera et al. (2018) found that taking a homeless person's perspective in VR increased passion, empathic concern and prosocial behaviours toward people experiencing homelessness compared to traditional forms of perspective-taking.

In conclusion, empathy is a sophisticated skill crucial to interpersonal interactions and associated with altruistic actions like charity giving. Especially by placing users in scenarios where they can experience what it is like to be in another person's shoes, VR has emerged as a promising tool for fostering empathy, particularly emotional empathy.

Finally, an exciting discovery was made by Kandaurova & Lee (2019), who found that empathy may mediate the relationship between VR and donation behaviour and that *social presence* may be a potential mediator. Therefore, the next chapter will discuss the main findings of social presence to learn more about the relationship between *empathy* and *social presence* and explore how *social presence* could mediate VR and donation behaviour.

2.3.2 Social Presence

Social presence is a term used to describe feeling present in a virtual or computer-generated environment (Sheridan, 1992). The concept of social presence originates from telepresence, which refers to the feeling of being present in a remote operation site (Baus & Bouchard, 2017).

Virtual Reality (VR) could be one technology that uniquely creates a sense of presence in its users since Steuer (1992) identifies "presence" as the fundamental concept of VR in terms of human experience. According to Kandaurova & Lee (2019) and Wedel et al. (2020), the more attention users pay to a virtual environment, the more their sensory perception is dominated and the greater the sense of presence. VR provides that kind of rich medium that combines visual and audio dimensions in a 360-degree view and interactive features that can further enhance the feeling of presence (Kandaurova & Lee, 2019).
Another interesting finding was made by Wagler & Hanus (2018), who found that individuals who experienced 360-degree videos had the same or similar emotional engagement and preferences as those who were physically present. This finding suggests that VR has the potential to generate the same feelings as being physically present in a given environment.

Immersive media, such as VR, is more effective at eliciting presence, which is a crucial driver of behaviour and attitude change, according to research by Pimentel et al. (2021). In addition, Kandaurova & Lee (2019) argue that social presence can boost accountability and, specifically, prosocial behaviour. That would mean that social presence would have the potential to close the social and psychological distance between donors and beneficiaries in non-profit fundraising (Yoo & Drumwright 2018).

In addition, studies have found a correlation between *social presence* and *empathy* (Bailenson, 2003; Domínguez, 2017). On the one hand, social presence refers to the perception of others in a mediated environment as conscious and aware, thereby enhancing empathy (Bailenson, 2003). However, on the other hand, Sas (2004) found that people with high empathic dispositions report stronger feelings of presence when navigating in an immersive virtual environment, as measured by the Interpersonal Reactivity Index (IRI). According to the literature, it is stated that both social presence and empathy are experienced in VR and may mediate donation intention (Yoo & Drumwright, 2018).

In conclusion, social presence is the feeling of being present in a virtual environment, and VR is a technology that has the potential to create a strong sense of presence. Furthermore, various studies have linked empathy and donation behaviour. Therefore, as immersive VR media becomes more popular, it will be interesting for non-profits to understand how social presence and empathy could influence donation behaviour in virtual environments.

2.4 Hypothesis and Conceptional Model

Based on the literature review, this section presents four hypotheses exploring the relationship between Virtual Reality (VR) and donation behaviour. Drawing on previous research and theoretical frameworks, a conceptual model that outlines the potential mechanisms underlying this connection is presented in the following. By examining the role of VR-related factors and their influence on psychological processes, this model provides a theoretical foundation for understanding the potential impact of VR experiences on individuals' propensity to engage in donation behaviour.

Hypothesis:

H1: The use of Virtual Reality (VR) has a positive influence on donation behaviour compared to non-VR experiences.
H2: The relationship between Virtual Reality (VR) and donation behaviour is meditated by the degree of empathy.
H3: The relationship between Virtual Reality (VR) and donation behaviour is meditated by the degree of social presence.

The following model illustrates the relationship between Virtual Reality (VR) and donation behaviour, incorporating the two critical explanatory variables identified in the literature: empathy and social presence. Hypotheses H1-3 propose that VR generates immersive and interactive experiences, enhancing individuals' levels of empathy and social presence. These heightened psychological states are posited to mediate the relationship between VR and donation behaviour.

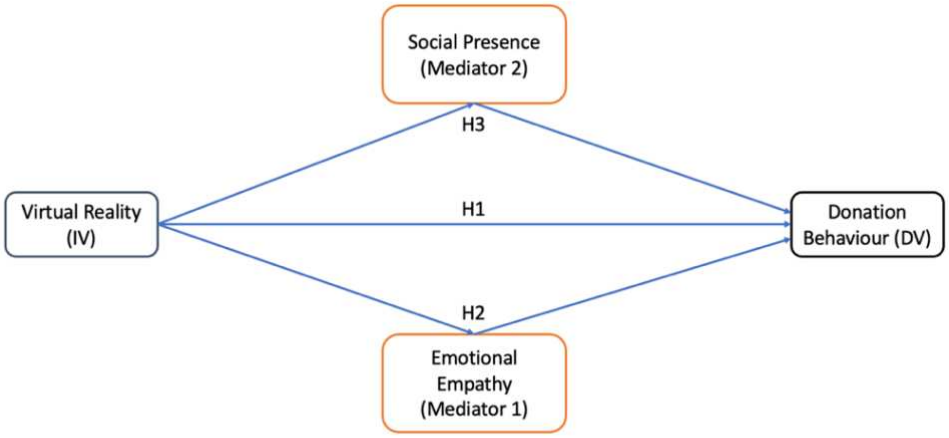

Figure 1: Proposed Model for the relationship VR – Donation Behaviour

Chapter 3: Research methodology

3.1 Research problem

To address the research question: "How and why does the use of Virtual Reality (VR) impact an individual's donation behaviour compared to traditional media?" primary data from students were collected through an experiment that compares donation behaviour in VR and non-VR appeals. Similar research questions have been tested in previous literature through live observations, literature review or meta-analysis (Grudzewski et al., 2018; Rueda & Lara, 2020; Ventura et al., 2020). Following these studies, one suitable method for conducting such an investigation is a lab experiment including live observations (Kristofferson et al., 2022; Pimentel et al., 2021). In this study, a single factor with two conditions (VR vs. non-VR) was carried out, and quantitative data was collected through a questionnaire.

3.2 Charitable appeal

Within the experiment, a social project was presented in Virtual Reality (VR) and non-VR to participants. The presenter showcased the Eagle's Nest kindergarten in Grabouw, South Africa, established by BuildingFuture e.V., a non-profit organisation founded by the author in 2016 to promote education in developing countries. Situated in a poor neighbourhood, the kindergarten provides daycare for 96 children and afternoon care for 100 children. The establishment of the kindergarten was completed in 2021, and local teachers currently operate it. Local authorities

and non-profit organisations have been involved and integrated into the existing infrastructure since the start of the construction process.

BuildingFuture, as a non-profit, emphasises transparency for its sponsors, utilising technology to make their projects emotionally tangible. As an illustration, they offer sponsors an augmented reality (AR) solution on postcards, enabling them to monitor the project's progress from anywhere in the world by filming the postcard with their smartphones. The aim for transparency and the use of technology demonstrates the organisation's strong interest in the outcomes of its work.

3.3 Experiment and set-up

The experiment was exclusively conducted on randomly selected German students from Universidade Católica Portuguesa. This approach aimed to minimise the influence of disruptive factors that could potentially impact the results. By selecting participants from a specific nationality, in this case, Germans, the sample becomes more homogeneous, which helps in ruling out alternative explanations for the results. This homogeneity increases the control over potential confounding variables and allows for a clearer understanding of the effects being studied. Another reason for choosing just German students was to reduce the novelty effect, which can occur when participants are unfamiliar with the product (Rueda & Lara, 2020). The authors suggest that students, specifically, have a strong affinity for VR and are more likely to have previous experience with it as a target group. Furthermore, organisations often seek to establish long-lasting relationships early on, and students are considered a desirable target audience for contribution campaigns (Kandaurova & Lee, 2019).

The participants of the study were randomly and equally split into the two appeal groups (VR and non-VR), and following the experiment, each participant answered an identical questionnaire. Furthermore, participants were asked to answer either Group A (VR appeal) or Group B (non-VR appeal) on the questionnaire to distinguish between the groups. Participants were not told what the other group would view using these group labels, reducing the possibility of confounding effects.

During the experiment, participants either visited the kindergarten using VR glasses (VR approach) or viewed the same information and images of the kindergarten on a conventional landing page (non-VR approach). The pictures depicted various kindergarten areas, including

the parking area, thrift shop, entrance area, kitchen, playground, one of the three classrooms, and the orchard. Notably, the goal was to minimise disrupting influences and concentrate entirely on the infrastructure. Hence, none of the photographs featured people, video footage, or played sound throughout the tour. In Appendix I, pictures of the content of both groups are presented.

After briefly explaining the experiment, participants were seated in a classroom at the Católica Lisbon School of Business & Economics. They were equipped with a head-mounted display (HMD) for the VR approach or a MacBook Air for the non-VR approach (pictures of the equipment are presented in the Appendix). In both appeal groups, participants could navigate through different Eagle's Nest kindergarten rooms using a joystick (VR) or a computer mouse (non-VR).

3.4 Measures

Several measures were leveraged to examine the participant's responses in the study to analyse the relationship between Virtual Reality (VR) and donation behaviour. This chapter will briefly present how the variables of donation behaviour and the two mediators, *empathy* and *social presence*, were measured. As described above, VR was queried by asking for the group - Group A or B – at the beginning of the questionnaire. Please find that item and all other items used in the questionnaire in the Appendix.

In this study, both *donation intention* and *donation behaviour* were measured to capture a comprehensive understanding of the relationship between VR and donation behaviour. This decision was supported by findings from Pimentel et al. (2021), who suggest that empathy exerts a more substantial influence on donation intention, the preliminary stage of donation behaviour. Furthermore, Martingano et al. (2022) also measured both donation intention and donation behaviour, along with VR as the independent variable, indicating the importance of examining both constructs in the context of VR. Additionally, Kandaurova & Lee (2019) posits that individuals with higher donation intention are more likely to engage in actual donation actions, emphasising the significance of capturing both intent and behaviour in this study.

After experiencing the virtual tour of the kindergarten, participants were presented with a scenario related to the funding situation of the facility. They were informed that the

kindergarten would no longer receive government financing due to the pandemic and financial challenges. To ensure continued care for the children, private donations were now necessary. Thus, the subsequent donation-related questions in the survey referred to this specific circumstance (Kandaurova & Lee, 2019).

To assess the variable donation intention, participants were asked to indicate the amount they would donate towards the planned extension of Eagle's Nest after going through the virtual tour. They could choose any amount between zero and one hundred euros, providing insight into their donation intent (Kandaurova & Lee, 2019).
Furthermore, the study included a question to evaluate participants' actual donation behaviour, drawing inspiration from the work of Pimentel et al. (2021). Participants were informed that by completing the survey, they would be automatically entered into a prize draw for a chance to win one hundred euros. If they won, they were required to specify the amount they wished to donate towards the project extension, which would then be deducted from the total prize amount. The range of which they could choose a value was between 0 and 100 euros (Pimentel et al., 2021).

Emotional empathy was measured using six items with a 7-point Likert-type scale, which asked participants to rate their emotional reactions to the experience. According to the scale of Martingano et al. (2022), participants could place their emotions from "not at all" to "extremely". According to the author, cognitive empathy is difficult to measure as it demands mental exertion, so this study considers emotional empathy. In the subsequent chapters, the variable "empathy" will refer specifically to emotional empathy.

Finally, *social presence* was measured using a 7-point Likert-type scale with five items. Participants were asked to rate their agreement or disagreement with statements about how connected they felt to others during the experience. Participants could rate their agreement from "strongly disagree" to "strongly agree" (Slater et al., 1994).

Chapter 4: Data exploration and Empirical Methods

4.1 Data

For the analysis, primary data was collected through a lab experiment involving students from Universidade Católica Portuguesa. Randomly chosen students were approached in common areas of the university and invited to participate in an experiment without being informed about the study's background. Consequently, all students were unaware of the research objective and were individually requested to go to the university's experimental room. Precautions were taken to prevent any communication among the students after the experiment was concluded, which could potentially affect the study's outcome.

The data collection process involved the administration of a questionnaire immediately after the investigation, which consisted of 40 items encompassing nine distinct variables. It is important to note that only participants who willingly agreed to adhere to the specified conditions for participation (please refer to the Appendix for detailed information) were included in the analysis.

Participants were classified into two groups based on their inclination toward Virtual Reality (VR) or non-VR groups. This categorisation was accomplished for the analysis by transforming the group variable into a dummy variable named "VR" using the statistical software R.
Similarly, the gender variable was also transformed into a binary dummy variable.
Furthermore, *empathy*, *social presence*, *vividness*, *interactivity*, and *immersion* were converted into constructed numerical variables by taking the mean of their associated items.
Within the questionnaire, the participants' donation intention and behaviour were assessed using two different items: one administered at the beginning and another at the end of the questionnaire (for a detailed explanation, refer to Chapter 3.4).

4.2 Descriptive Statistic

A total of 103 students participated individually in the experiment. As three participants incorrectly answered the attention question (see Appendix II), they were excluded from the analysis. Please find below a table with the most critical demographic numbers of the 100 participants:

Demographic_Variable <chr>	Overall_Sample <chr>	VR_Condition <chr>	Non_VR_Condition <chr>
Number participants	100	50	50
Age	Mean: 25.29 Max: 29 Min: 22	Mean: 24.94	Mean: 25.64
Gender	Male: 50 Female: 50	Male: 25 Female: 25	Male: 25 Female: 25
Student status	Student: 76 Alumni: 24	Student: 39 Alumni: 11	Student: 37 Alumni: 13
VR-usage	Not familiar: 27 Familiar: 73	Not familiar: 16 Familiar: 34	Not familiar: 11 Familiar: 39

Table 1: Main demographics

The results show that the 100 participants were evenly distributed across the experimental conditions, with 50 participants in each group (VR Condition and Non-VR Condition). Moreover, most participants were still actively pursuing their studies and had not yet completed their master's thesis at the time of the survey. Furthermore, it is noteworthy that almost three-quarters of the participants reported previous experience with VR headsets, indicating a relatively high familiarity with VR technology among the sample.

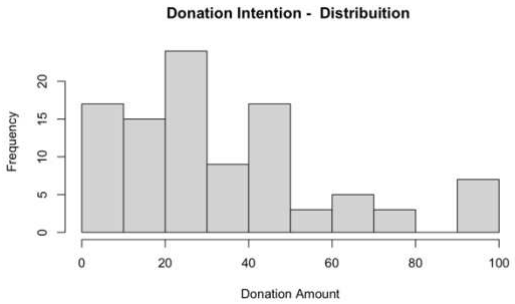

Table 2: Distribution of variable donation intention

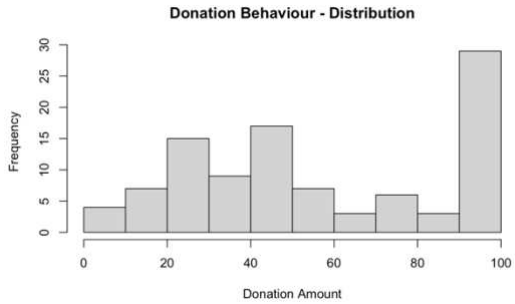

Table 3: Distribution of variable donation behaviour

Tables 2 and 3 depict the distribution of the variables: Donation intention and donation behaviour. The average donation amount for donation intention was 36.03 euros. In contrast, donation behaviour reached 59.79 euros, which can also be seen from the distribution in Table 3 shifted to the right. Due to the substantial difference in donation amounts, these findings present compelling insights, with donation behaviour surpassing the intention by more than 20 euros on average. This significant variation implies the existence of distinct factors that potentially impact individuals' donation behaviour.

4.3 Empirical Strategy

As recommended in previous research, this study used linear regression analysis to examine the relationship between Virtual Reality (VR) and donation behaviour, addressing Hypothesis 1 and other relationships (Kristofferson et al., 2022). The objective was to investigate whether a significant relationship existed between VR exposure and individuals' inclination to donate. By

using linear regressions, the aim was to quantify the strength and direction of this relationship and determine its statistical significance.

Moreover, mediation analyses were conducted to explore the potential mediating effects of *empathy* and *social presence*, as proposed in the literature (Kandaurova & Lee, 2019; Xu et al., 2021; Yoo & Drumwright, 2018). The purpose was to examine whether *empathy* and *social presence* mediate the relationship between VR and donation behaviour. Including such analyses in this study allowed for a deeper understanding of the underlying mechanisms that explain the relationship between VR and donation behaviour. Before proceeding with the mediation analysis, preliminary linear regression analyses were conducted to assess the relationships between *social presence* and *empathy* and donation intention and behaviour as dependent variables. These initial regression analyses aimed to determine whether significant associations existed, indicating the potential mediating role of *social presence* and *empathy*.

The results will be presented in the upcoming chapter, comprehensively analysing the findings. The outcomes of the linear regression analysis will be discussed to examine the relationship between VR and donation behaviour. Additionally, the influence of VR on *immersion*, *interactivity*, and *vividness* will be explored through linear regression analyses. Furthermore, the potential mediating effects of *empathy* and *social presence* in the relationship between VR and donation behaviour will be examined using mediation analyses. A concise and broad overview of the study's findings will be presented in the subsequent chapter by showing these results.

Chapter 5: Results and Conclusion

5.1 Hypotheses

H1: The use of Virtual Reality (VR) has a positive influence on Donation Behaviour compared to non-VR experiences.

	Dependent variable:	
	Donation Intention (1)	Donation Behaviour (2)
VR	31.660***	39.700***
	(4.067)	(4.779)
Constant	20.200***	39.940***
	(2.876)	(3.379)
Observations	100	100
R2	0.382	0.413
Adjusted R2	0.376	0.407
Residual Std. Error (df = 98)	20.337	23.894
F Statistic (df = 1; 98)	60.588***	69.013***
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table 4: Results of the relationship between VR – donation intention and VR – Donation behaviour

The current study sought to examine the impact of Virtual Reality (VR) on participants' donation behaviour. Based on the literature, the variable donation intention was also queried. Hypothesis 1 posited that the use of VR would have a positive effect on individuals' propensity to donate compared to non-VR experiences.

The findings of Table 4 demonstrate a statistically significant association between VR and participants' donation behaviour and donation intention. Participants who engaged with head-mounted display (HMD) headsets within Group A of the experiment were more inclined to donate than those who did not utilise VR headsets when visiting the kindergarten.
The estimated coefficient for VR concerning donation intention is 31.660, indicating that, on average, participants employing VR headsets exhibited higher donation intentions by 31.660 euros compared to those without VR headsets.

These findings support Hypothesis 1, underscoring the positive influence of VR utilisation on donation behaviour. The analysis finds robust evidence that participants donning VR headsets

are more motivated to donate and are more likely to translate their intentions into tangible contributions. The observed effect sizes of 31.660 euros for donation intention and 39.700 euros for donation behaviour emphasise the substantial impact of VR on individuals' propensity to contribute to charitable causes.

Moreover, these findings align with prior research on that topic, which also documented the significant impact of VR on donation intention and behaviour (Kandaurova & Lee, 2019; Martingano et al., 2021, 2022). Additionally, as suggested in the study by Kandaurova & Lee (2019), participants tended to donate more in actual behaviour than initially anticipated.

	Dependent variable:
	Donation Intention
Presence	5.739**
	(2.476)
Empathy	7.774***
	(2.245)
Constant	-24.230***
	(8.194)
Observations	100
R2	0.410
Adjusted R2	0.398
Residual Std. Error	19.974 (df = 97)
F Statistic	33.703*** (df = 2; 97)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 5: Multiple Regression Model of social presence and empathy on donation intention

	Dependent variable:
	Donation Behaviour
Presence	8.037***
	(2.462)
Empathy	11.604***
	(2.233)
Constant	-27.590***
	(8.148)
Observations	100
R2	0.599
Adjusted R2	0.590
Residual Std. Error	19.861 (df = 97)
F Statistic	72.367*** (df = 2; 97)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 6: Multiple Regression Model of social presence and empathy on donation behaviour

Next, a linear regression model was employed to elucidate the underlying mechanisms of the relationships between VR, empathy, social presence, and donation-related outcomes. The aim was to explore the association between *empathy* and *social presence* with both donation variables, as those two may serve as potential mediators for the relationship between VR and donation behaviour.

The findings in Table 5 and Table 6 indicate that both *empathy* and *social presence* significantly influence both donation intention and behaviour. It can be assumed that higher levels of empathy and social presence are associated with an increased likelihood of engaging in donation-related behaviours.

Thus, *empathy* and *social presence* can be considered suitable mediators in further mediation analyses to elucidate the underlying mechanisms of the relationships between VR, empathy, social presence, and donation-related outcomes.

H2: The relationship between Virtual Reality (VR) and Donation Behaviour is meditated by the degree of empathy.

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME             13.064        5.117        21.91   0.008 **
ADE              18.590        7.613        29.47   0.004 **
Total Effect     31.655       24.018        39.39  <2e-16 ***
Prop. Mediated    0.409        0.156         0.72   0.008 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 7: Empathy as a mediator for the relationship of VR – donation intention

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME             26.235       17.152        36.59  <2e-16 ***
ADE              13.501        1.870        24.32   0.026 *
Total Effect     39.736       30.540        48.83  <2e-16 ***
Prop. Mediated    0.658        0.437         0.94  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 8: Empathy as a mediator for the relationship of VR – donation behaviour

The mediation analysis results examining the role of empathy as a mediator between VR and donation intention (Table 7) reveal significant indirect effects, supporting the hypothesis that empathy significantly mediates the relationship between VR and donation intention. The Average Causal Mediation Effect (ACME) of 13.064 indicates that empathy partially mediates the impact of VR on donation intention. Furthermore, the Average Direct Effect (ADE) of 18.590 suggests that there is also a direct effect of VR on donation intention, which aligns with the results of Hypothesis 1. The Total Effect of 31.655 indicates that the mediation analysis was performed correctly, showing the same coefficient as in Table 1. The Proportion Mediated value of 0.409 suggests that empathy mediates 40.9% of the effect of VR on donation intention.

Similarly, the mediation analysis examining empathy as a mediator between VR and donation behaviour (Table 8) reveals significant indirect effects. The ACME of 26.235 demonstrates a substantial mediating impact of empathy on the relationship between VR and donation behaviour. The Proportion Mediated of 0.658 indicates that empathy mediates 65.8% of the effect of VR on donation behaviour.

The significant indirect effects found in the mediation analysis support the role of empathy as a mediator in the relationship between VR technology and participants' donation intentions and behaviours, confirming Hypothesis 2. These findings are consistent with previous research by Martingano et al. (2021) and Baumeister et al. (2007), who have also found that VR can elicit empathy and is associated with prosocial behaviour.

H3: The relationship between Virtual Reality (VR) and donation behaviour is meditated by the degree of Social Presence.

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME             8.7842      -3.4759        21.12    0.16
ADE             22.7465       8.6681        37.88  <2e-16 ***
Total Effect    31.5307      23.8220        39.44  <2e-16 ***
Prop. Mediated   0.2859      -0.0926         0.69    0.16
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 9: Social presence as a mediator for the relationship of VR – Donation intention

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME             27.215       14.464        41.26  <2e-16 ***
ADE              12.124       -3.760        27.24    0.14
Total Effect     39.339       29.932        49.18  <2e-16 ***
Prop. Mediated    0.686        0.367         1.11  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 10: Social presence as a mediator for the relationship of VR – Donation behaviour

The results presented in Table 9 analyse the mediating role of *social presence* between VR and donation intention. Interestingly, the indirect effect measured by ACME is not statistically significant. In terms of the proportion mediated value, it suggests that only a tiny portion of the effect of VR on donation intention can be attributed to the mediating role of social presence; thus, it is not statistically significant.

Contrastingly, when analysing donation behaviour as a dependent variable in Table 10, the mediation analysis reveals a significant indirect effect and a significant total effect, indicating a substantial relationship between VR and donation behaviour when mediated by *social presence*. Therefore, hypothesis 3 can be accepted. The proportion mediated value suggests that a significant portion of the effect of VR on donation behaviour can be attributed to the mediating role of *social presence*, accounting for 68.6% of the impact.

The findings of this study support the hypothesis that VR can enhance individuals' sense of social presence and empathy, leading to increased prosocial behaviour, as suggested by Wagler & Hanus (2018) and Yoo & Drumwright (2018). Thus, other factors beyond social presence may influence the relationship between VR and donation intention. Therefore, further investigation is needed to explore these factors and their potential mediating role in the VR – donation intention relationship.

5.2 Extended Analysis

5.2.1 Relationship VR - Immersion, interactivity, vividness

The first extended analysis investigates the relationship between Virtual Reality (VR) and the three main characteristics outlined in the literature review. It begins by describing the methodology used to test these variables. Next, a linear regression model is employed to analyze the association between VR and each characteristic. Finally, the results are compared with existing literature to identify parallels or deviations.

Immersion was tested using three items with a 5-point Likert-type scale, which asked participants to rate how much they felt immersed in the experience on a scale of one to five, with one being not immersed and five being extremely immersed (Kandaurova & Lee, 2019).

Interactivity was tested using three items on a 7-point Likert-type scale, which asked participants to rate their agreement or disagreement with statements related to how interactive the experience was. Participants could rate their agreement from "strongly disagree" to "strongly agree". The scale is based on the work of Pimentel et al. (2021), which creates a reliable and valid measure of *interactivity*.

Vividness was measured using one item on a 7-point Likert-type scale, which required participants to rate their agreement or disagreement about how vivid and lifelike the experience felt. Again, participants could order their arrangement from "strongly disagree" to "strongly agree", and in creating this scale, inspiration from Steuer's work was taken (Yoo & Drumwright, 2018).

	Dependent variable:		
	Interactivity	Immersion	Vividness
	(1)	(2)	(3)
VR	2.220***	1.660***	3.680***
	(0.223)	(0.136)	(0.202)
Constant	3.440***	2.127***	2.440***
	(0.158)	(0.096)	(0.143)
Observations	100	100	100
R2	0.502	0.602	0.773
Adjusted R2	0.497	0.598	0.770
Residual Std. Error (df = 98)	1.117	0.681	1.008
F Statistic (df = 1; 98)	98.805***	148.451***	333.121***
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 11: Perceived Level of interactivity, immersion and vividness of participants

The results of the linear regression analysis in Table 8 provide valuable insights into the relationships between Virtual Reality (VR) and three dependent variables: *Interactivity*, *immersion*, and *vividness*.

Regarding the perceived level of interactivity, participants who experienced the experiment with a head-mounted display (HMD) in VR had, on average, significantly higher scores than those who visited the kindergarten via the website. The coefficient of 2.220 ($p < 0.01$) suggests that VR enhances the level of interactivity experienced by participants during the experiment.
Similarly, participants in the VR condition had significantly higher scores for the variable *immersion* than those in the non-VR condition. The coefficient of 1.660 ($p < 0.01$) indicates a significant positive relationship between VR and *immersion*.
Furthermore, concerning the level of vividness, participants who wore VR glasses had significantly higher scores than those without VR. The coefficient of 3.680 ($p < 0.01$) indicates a significant positive relationship between VR and vividness.
These findings demonstrate that VR technology strongly influences participants' experiences of interactivity, immersion, and vividness.

These results align with previous research conducted by Wedel et al. (2020), Eelen et al. (2013), and Jiang & Benbasat (2007), who have also highlighted the associations between these variables and VR experiences. The significant positive relationship observed in this study between VR and participants' levels of interactivity, immersion, and vividness further strengthens the existing body of knowledge regarding the impact of VR on these aspects.

5.2.2 Immersion, interactivity, and vividness as Mediators

The confirmation that VR has the potential to elicit a heightened level of the three characteristics provides the momentum for further exploration in this chapter. The focus shifts to a more detailed investigation of the connection between VR and the two mediators, *empathy* and *social presence*, and examining the influence exerted by these three characteristics. To achieve this, mediation analyses are employed to scrutinize each characteristic's impact on the relationship between VR and social presence and VR and empathy.

The following mediation analyses provide insights into the role of these variables in enhancing social presence and empathy in VR experiences:

Immersion

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME              0.738        0.436         1.06  <2e-16 ***
ADE               1.307        0.958         1.69  <2e-16 ***
Total Effect      2.045        1.767         2.31  <2e-16 ***
Prop. Mediated    0.362        0.206         0.52  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 12: Mediation analysis VR-social presence with the mediator immersion

The ACME value for *immersion* as a mediator on the relationship between VR and *social presence* is 0.738 with a p-value <0.001, which indicates a significant positive indirect effect of *immersion* on *social presence* when considering VR. Furthermore, the ADE value is 1.307, demonstrating a highly effective direct impact between VR and *social presence* when *immersion* is not considered. Moreover, the total effect, representing the combined direct and indirect effects, is estimated as 2.045, with a p-value <0.001, indicating a highly significant relationship.

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME             1.4503       1.0347         1.93  <2e-16 ***
ADE              0.4964       0.0489         0.95   0.028 *
Total Effect     1.9467       1.5827         2.34  <2e-16 ***
Prop. Mediated   0.7435       0.5393         0.97  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 13: Mediation analysis VR-empathy with the mediator immersion

When analysing the mediation effect of *immersion* on the relationship between VR and empathy, the ACME value is 1.450 (p<0.001), which indicates a significant positive indirect effect of immersion on the abovementioned relationship. The ADE value is 0.4964, demonstrating a less significant direct effect between VR and *empathy* when *immersion* is not considered.

Finally, the total effect is estimated as 1.9467, with a p-value <0.001, revealing a highly significant relationship of which *immersion* accounts for 75%.

Interactivity

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME              0.753        0.495         1.05  <2e-16 ***
ADE               1.289        0.964         1.62  <2e-16 ***
Total Effect      2.042        1.782         2.29  <2e-16 ***
Prop. Mediated    0.367        0.237         0.50  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 14: Mediation analysis VR-social presence with the mediator interactivity

Next, the variable *interactivity* was tested to determine whether it mediates the relationship between VR and *social presence*/*empathy*. For social presence as the dependent variable and VR as the independent variable, the mediation analysis revealed *interactivity*'s significant positive indirect effect, with an ACME value of 0.753 (p<0.001). The ADE value 1.289 (p<0.001) indicates a highly effective direct result between VR and *social presence*, which was already confirmed in the previous analysis. The total impact was estimated at 2.042, with a p-value <0.001.

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME              0.793        0.453         1.16  <2e-16 ***
ADE               1.154        0.667         1.64  <2e-16 ***
Total Effect      1.947        1.550         2.32  <2e-16 ***
Prop. Mediated    0.403        0.233         0.62  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 15: Mediation analysis VR-empathy with the mediator interactivity

The analysis showed a significant positive indirect effect of *interactivity* for empathy, with an ACME value of 0.793 ($p<0.001$). The ADE value of 1.154 ($p<0.001$) indicates a substantial direct impact between VR and Empathy. The total effect was estimated at 1.947, with a p-value <0.001. These findings suggest that interactivity contributes significantly to developing empathy in VR experiences.

Vividness

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME           -0.00236     -0.46040         0.49    0.98
ADE             2.03697      1.51048         2.59  <2e-16 ***
Total Effect    2.03462      1.78540         2.30  <2e-16 ***
Prop. Mediated -0.00416     -0.22961         0.24    0.98
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 100
```

Table 16: Mediation analysis VR-social presence with the mediator vividness

The analysis of *vividness* as a mediator showed no significant indirect effect, as the ACME value was -0.00236. However, VR and social presence had a highly effective direct effect, with an ADE value of 2.03697, already proven in the previous chapter. These findings suggest that even if there is a high direct effect between VR and *social presence*, *vividness* does not mediate the relationship between VR and *social presence*.

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME            -0.1528      -0.8860         0.56    0.67
ADE              2.0995       1.3415         2.90  <2e-16 ***
Total Effect     1.9467       1.5612         2.34  <2e-16 ***
Prop. Mediated  -0.0777      -0.4623         0.29    0.67
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 17: Mediation analysis VR-empathy with the mediator vividness

Regarding the case of empathy, the analysis indicated that vividness had no significant indirect effect again, with an ACME value of -0.1528. However, VR and *empathy* had a highly effective direct effect, with an ADE value of 2.0995. The total impact was estimated at 1.9467, with a p-value <0.001. These results suggest that *vividness* does not act as a mediating factor in the relationship between VR and empathy.

5.2.3 Relationship between Social Presence and Empathy

Another intriguing insight is to understand the relationship between social presence and empathy. Therefore, the interaction between these two mediators will be analysed in the following:

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME              1.102        0.557         1.64  <2e-16 ***
ADE               0.856        0.213         1.47   0.008 **
Total Effect      1.959        1.584         2.33  <2e-16 ***
Prop. Mediated    0.562        0.283         0.88  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 18: Mediation analysis VR-empathy with social presence as a mediator

The first mediation analysis, which examines the relationship between VR and empathy with *social presence* as a mediator, shows that both ACME and ADE values were significant. The ACME value is 1.102 ($p<0.001$), indicating a significant indirect effect of VR on *empathy* through *social presence*. The ADE value is 0.856 ($p<0.001$), suggesting a significant direct impact between VR and empathy, already proven in previous sections. The total effect was estimated at 1.959, with a p-value <0.001, indicating a strong relationship between VR, social presence, and empathy.

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME              0.550        0.287         0.83  <2e-16 ***
ADE               1.493        1.159         1.84  <2e-16 ***
Total Effect      2.043        1.788         2.31  <2e-16 ***
Prop. Mediated    0.273        0.136         0.40  <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 100


Simulations: 1000
```

Table 19: Mediation analysis VR-social presence with empathy as a mediator

In the second mediation analysis, both ACME and ADE values are significant in investigating the relationship between VR and *social presence* with *empathy* as a mediator. The ACME value is 0.550 ($p<0.001$), indicating a significant indirect effect of VR on social presence through empathy. The ADE value is 1.493 ($p<0.001$), suggesting a significant direct impact between VR and *social presence*.

The mediation analyses revealed that both *social presence* and *empathy* are significant mediators in the relationship between VR and donation behaviour and interact with each other. The significant ACME and ADE values and the fact that both mediate each other's relationship with VR indicate a reciprocal influence between social presence and empathy.

5.2.3 Trust

According to the study of Francioni et al. (2021), which investigates the relationship between trust, engagement, and various outcomes, it is suggested that the variable trust can significantly influence attitudes and actions towards donations. The study, conducted with samples of US

and Italian alums, reveals that engagement is a precursor to trust, which leads to positive outcomes such as support, commitment, and favourable attitudes toward donations. Therefore, the impact of trust on the relationship between VR and donation behaviour will be examined and seen as a robustness test for the central mediator's *empathy* and *social presence* if the outcome is insignificant. Like all other items, the exact item to query the variable can be found in the Appendix.

	Dependent variable:
	Donation Behaviour
VR	2.607
	(7.518)
Empathy	11.393***
	(2.324)
Presence	7.320**
	(3.224)
Constant	-24.534**
	(12.027)
Observations	100
R2	0.599
Adjusted R2	0.587
Residual Std. Error	19.952 (df = 96)
F Statistic	47.847*** (df = 3; 96)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 20: Multiple regression model VR, empathy, social presence on donation behaviour

	Dependent variable:
	Donation Behaviour
VR	4.588
	(7.715)
Empathy	10.695***
	(2.404)
Presence	5.562
	(3.585)
Trust	3.529
	(3.166)
Constant	-26.642**
	(12.159)
Observations	100
R2	0.604
Adjusted R2	0.588
Residual Std. Error	19.926 (df = 95)
F Statistic	36.287*** (df = 4; 95)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 21: Robustness Check with trust as a control variable

The initial model (Table 20) examined the relationship between VR, empathy, social presence, and donation behaviour. The R^2 of 0.599 indicates that these variables collectively explain approximately 59.9% of the variance in donation behaviour.

To explore the robustness of the proposed model (Figure 1), the variable trust was included in the analysis (Table 21). The revised model showed a slightly increased R^2 of 0.604, suggesting that including trust marginally improved the model's explanatory power. However, it is worth noting that the coefficient for trust and social presence was not statistically significant, implying that trust does not significantly explain donation behaviour in this dataset.

Therefore, the findings suggest that while the overall model's R^2 increased slightly with the inclusion of trust, the significance of trust as a predictor for donation behaviour is nonexistent. It can be concluded that *empathy* and *social presence* are the main explanatory variables for donation behaviour in this study, whereas trust appears to have no explanatory power.

5.2.5 Newsletter:

Maintaining a strong connection with potential donors is paramount, and one way organisations achieve this is through newsletter subscriptions (Hoefer & Twis, 2018). By keeping donors well-informed, organisations aim to establish enduring relationships. Although a study by Kristofferson et al. (2022) did not identify a significant relationship between VR and newsletter sign-ups, it is an essential method for a long-term relationship between donor and organisation and is therefore integrated into the questionnaire. Thus, the study includes a specific inquiry to explore the potential connection between VR experiences and the willingness to subscribe to newsletters.

	Dependent variable:
	Newsletter
VR	-0.041
	(0.103)
Constant	0.646***
	(0.071)
Observations	91
R2	0.002
Adjusted R2	-0.009
Residual Std. Error	0.489 (df = 89)
F Statistic	0.161 (df = 1; 89)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 22: Relationship VR and newsletter sign-ups

The coefficient -0.041 indicates a slightly antagonistic relationship between VR and newsletter sign-ups. However, this effect is not statistically significant ($p > 0.1$), suggesting that VR does not significantly impact participants' willingness to sign up for a newsletter in this dataset.
On the other hand, the constant term in the regression model is 0.646 ($p < 0.01$), representing the baseline level of newsletter sign-ups when VR is not utilised. This result indicates that in the absence of VR, participants are interested in signing up for the newsletter after seeing the kindergarten on traditional media like websites.

The findings of this part of the analysis are consistent with the study by Kristofferson et al. (2022), which investigated the impact of VR on newsletter sign-ups and found that VR does not significantly influence participants' likelihood of subscribing to a newsletter.
It is worth noting that while VR may have the potential to influence newsletter subscriptions, the results of this particular dataset do not reveal a significant relationship, suggesting that

factors other than VR may be more substantial in determining participants' decision to sign up for a newsletter.

5.2.6 Volunteering

Finally, donations are vital in empowering organisations to bring their projects to life, while volunteer work is equally instrumental in making a difference. Research conducted by Gürerk & Kasulke (2018) suggests that heightened empathy is closely linked to a greater inclination to participate in voluntary activities. Therefore, the mediating effect of empathy in the context of Virtual Reality (VR) is being investigated to understand its impact on fostering a sense of volunteerism.

Based on the assumptions of Gürerk & Kasulke (2018), a mediation analysis was carried out to examine whether empathy mediates the relationship between VR and the desire to volunteer:

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

               Estimate 95% CI Lower 95% CI Upper p-value
ACME             0.3010       0.1260         0.48  <2e-16 ***
ADE             -0.1463      -0.3889         0.08    0.25
Total Effect     0.1546      -0.0163         0.33    0.09 .
Prop. Mediated   1.7952      -9.9287        14.34    0.09 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sample Size Used: 97


Simulations: 1000
```

Table 23: Mediation analysis of VR-volunteering mediated by empathy

The ACME value is calculated as 0.3010, indicating a significant mediating effect of empathy between VR and the desire to volunteer. This result suggests that when individuals engage with VR experiences, it stimulates their empathy, positively influencing their inclination to volunteer. The p-value associated with the ACME is <0.001, indicating a highly significant relationship.

On the other hand, the ADE value is estimated as -0.1463, with a confidence interval ranging from -0.3889 to 0.08. This outcome suggests no direct effect between VR and the desire to

volunteer when empathy is considered a mediating variable. In other words, the impact of VR on individuals' inclination to volunteer is mediated entirely through the experience of empathy.

5.3 Conclusion

The present study provides compelling evidence supporting the positive influence of VR utilisation on individuals' donation behaviour and intention. The results underscore the assumed substantial impact of VR on participants' willingness to donate and highlight the potential mediating role of *empathy* and *social presence* in this relationship.

The finding supports the notion that VR has the potential to enhance empathy and foster prosocial behaviours, such as charitable donations. In addition, the sense of social presence experienced in VR environments is crucial in influencing individuals' donation-related behaviours. The results indicate that social presence may not directly impact individuals' intentions to donate, but it significantly shapes their actual donation behaviours.

Furthermore, the robustness check for the proposed model of this study revealed that *social presence* and *empathy* are the primary mediators, explaining the relationship between VR and donation behaviour. Interestingly, including trust as an additional variable did not significantly influence donation behaviour, indicating that trust does not play a substantial role in explaining individuals' willingness to donate. Additionally, examining control variables, such as age and gender, within the robustness check did not significantly improve the model's goodness of fit.

Additionally, the study reveals that immersion and interactivity are critical factors in enhancing empathy and social presence in VR experiences. *Immersion* has a significant positive indirect effect on both empathy and social presence, as supported by previous research (Kandaurova & Lee, 2019; Monzel et al., 2023; Spielmann & Mantonakis, 2018). Similarly, *interactivity* demonstrates a significant positive indirect effect on empathy and social presence. However, the analysis does not support the mediating role of vividness in the relationship between VR and empathy or social presence (Monzel et al., 2023).

Moreover, the analysis reveals that VR does not significantly impact participants' likelihood of signing up for a newsletter, aligning with previous research on the limited influence of VR on newsletter subscriptions (Gürerk & Kasulke, 2018).

Finally, the study's findings further support the assumptions made by Gürerk & Kasulke (2018) regarding the mediating effect of empathy on the relationship between VR and the willingness to volunteer. The results indicate that VR experiences induce empathy in participants, leading to their desire to contribute to projects and volunteer their time and efforts.

Chapter 6: Limitations and future research

The following section discusses the study's limitations and provides recommendations for future research in the context of Virtual Reality (VR) and donation behaviour. While the study focused on *empathy* and *social presence* as critical mediation variables, it is essential to consider that other variables may also influence the relationship between VR and donation behaviour. In this study, variables such as trust, age, and gender were controlled for, but no significant associations were found in the dataset. These findings indicate the need for additional investigation into potential factors that may influence the relationship between VR technology and donation behaviour.

One limitation of the study is that it only examined the effect of donation behaviour by showcasing the kindergarten's building and infrastructure but not featuring the children and beneficiaries who would directly profit from the support. By focusing solely on the rational perspective, which emphasizes logical decision-making and tangible outcomes, the study may have overlooked the potential influence of emotions and personal connections in motivating individuals to contribute.

Another limitation is the specific target audience of students. While this study provides valuable insights for long-term approaches, as VR can engage young individuals and potentially secure their long-term support, it does not provide information on whether older individuals, who may have more disposable income, can be similarly influenced by VR. Additionally, the study's sample does not represent the general population, as it only surveyed students from a prestigious international university, excluding other educational and socioeconomic backgrounds. Future studies could expand the sample size, target different age groups, explore various income brackets, and investigate multiple education levels to obtain a more representative understanding.

Furthermore, considering individuals' current life situation and daily mood may be essential, as people experiencing negative emotions or personal difficulties may be less inclined to donate. Including these factors in future research could provide a more nuanced understanding of the relationship between VR and donation behaviour.

For further and more detailed research, it is recommended to create the VR tour by using more advanced software to enhance realism. This study utilised a free version from the internet with limited features. Thus, better software can improve the immersive experience and potentially impact donation behaviour.

Organisations considering VR as a fundraising tool must carefully consider the financial aspects. Professionally, presenting on-site projects through VR can be expensive, and assessing the return on investment (ROI) is crucial. Therefore, it is recommended to refine the target audience, conduct further research on the effectiveness of VR on different demographics, including businesses and foundations, and perform statistical analyses to determine the minimum number of donors required for VR implementation to be a viable and beneficial fundraising method.

It is also worth noting that this study focused specifically on examining the willingness of private individuals to donate. Like many laboratory experiments, this study has inherent limitations. While laboratory experiments offer robust internal validity due to the ability to control variables, their external validity may be limited as real-world dynamics are often more complex and varied. Therefore, it would be interesting in future research to investigate whether similar influences can be observed in companies or foundations, as individuals are also involved in decision-making in these organisations.

Finally, in this study, the donation range was limited to 0-100 euros, which may be perceived as too narrow for other generations to assess whether the investment in VR is worthwhile. Future research could explore wider donation ranges to gain a more comprehensive understanding of the impact of VR fundraising on different donor groups.

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Appendices

Appendix I: Lab Experiment

This Appendix provides a detailed account of the origins and development of the VR and Non-VR approaches for the experiment conducted at Eagle's Nest Kindergarten in January 2023. The following narrative sheds light on the process behind the experiment's creation and the visual experiences that both groups of participants encountered.

First, the author of this thesis visited Eagle's Nest Kindergarten, equipped with a GoPro Max 360 camera. In January 2023, he captured recordings of each room, meticulously documenting the environment from every angle (see Figures 2 and 3). This comprehensive approach ensured that the kindergarten's setting was accurately preserved, laying the foundation for both the VR and Non-VR approaches.

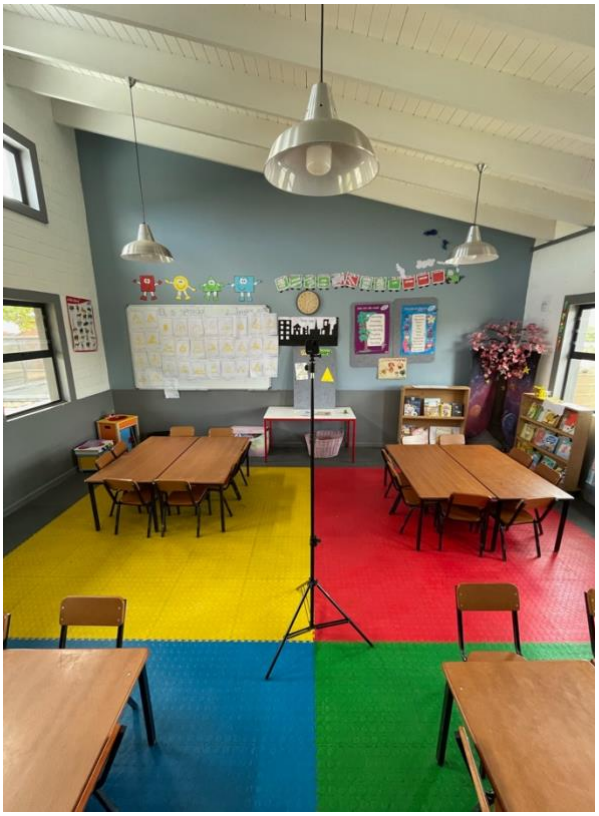

Figure 2: Classroom 1

Figure 3: Taking the VR-shots

Figure 4: Showing the results

Subsequently, the recorded images were shared with the children in the afternoon care program, and an introduction to Virtual Reality (VR) technology was provided (Figure 4). All pictures which were used for both approaches are shown in Figure 5-14:

Figure 5: Entrance Eagle's Nest

Figure 6: Thrift shop

Figure 7: Inside the thrift shop

Figure 8: Entrance hall

Figure 9: Kitchen

Figure 10: Playground

Figure 11: Classroom 2

Figure 12: Garden

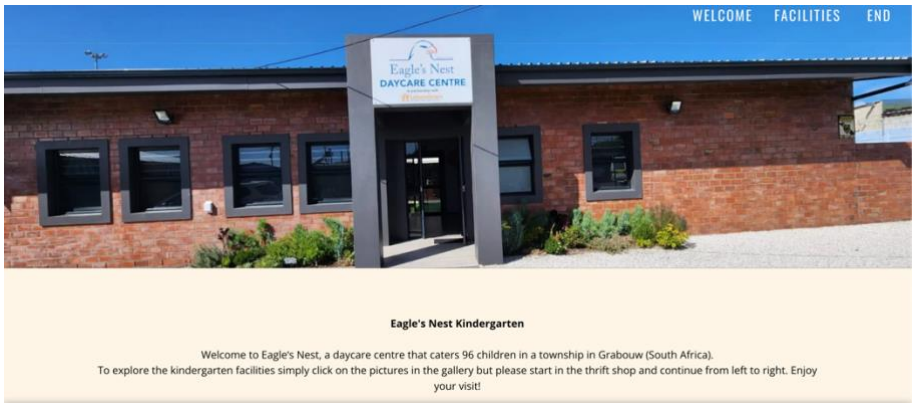

Figure 13: Website first page

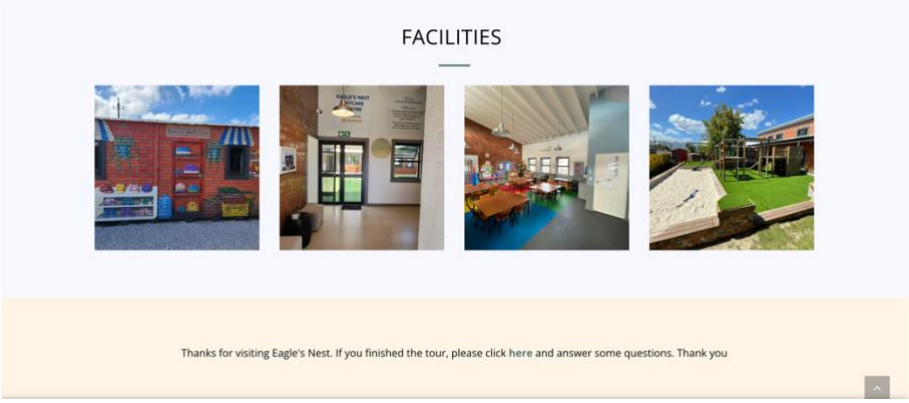

Figure 14: Website page 2

Lastly, during the lab experiment, the classroom setup was crucial in ensuring a unique VR experience for the participants (Figures 15 and 16). A 360-degree rotatable chair enabled

participants to move freely within the VR experience, further enhancing their sense of immersion and creating a captivating overall experience.

Figure 15: Classroom setup

Figure 16: The head-mountain display (VR glasses)

Appendix II: Outline of survey questions

Hello and welcome to this short questionnaire after visiting Eagle's Nest.

Your data will be gathered and examined anonymously. The data is only evaluated and utilised within the context of the study project. The General Data Protection Regulation (GDPR) of the European Union serves as the legal foundation for the data's storage. You can email me: s-fwaldthausen@ucp.pt with any inquiries you may have, withdraw your consent or study data, or speak with me face-to-face in the classroom. By clicking the button to begin the study below, you attest that you have fully read and comprehended the research participation material and are willing to participate.

Many thanks for your assistance!

Florian von Waldthausen

Do you agree to participate in the experiment?

Yes

No

Which experiment group were you assigned to?

Group A

Group B

→

The Eagle's Nest Kindergarten is located in a poor neighbourhood in the township of Grabouw, South Africa. It cares for 96 children in the morning and 100 school-going children in the afternoon. This kindergarten is the only opportunity for many of these children to receive an education, and it offers hope to the entire community. Without access to education, children and young people risk remaining impoverished and vulnerable to criminal activity and drugs.

Unfortunately, due to recent political unrest and the COVID-19 pandemic, several funding sources have been reduced, putting the kindergarten at risk of closure. As a result, private donations are required to support Eagle's Nest kindergarten until government institutions can provide funding again. This moment is critical, and any support would be greatly appreciated to ensure these children have a chance to succeed and break free from the cycle of poverty.

Given the situation, how much money (in €) would you be willing to donate from your personal funds to support the kindergarten?

0 10 20 30 40 50 60 70 80 90 100

Please choose an amount

To what extent do you agree with the following statements?:

While visiting the kindergarten, I felt:

- Not engaged
- Somewhat engaged
- Moderately engaged
- Very engaged
- Extremely engaged

While visiting the kindergarten, I felt:

- Not immersed
- Somewhat immersed
- Moderately immersed
- Very immersed
- Extremely immersed

While visiting the kindergarten, I felt:

- Not integrated
- Somewhat integrated
- Moderately integrated
- Very integrated
- Extremely integrated

N

The kindergarten visit was interactive for me.

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Somewhat agree
- Strongly agree

I felt I had control over what I want to see.

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Somewhat agree
- Strongly agree

My actions decided the kind of experience I got.

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Somewhat agree
- Strongly agree

To what extent do you agree with the following statements?:

I really felt an emotional response to what I was seeing.

- Not at all
- Very slightly
- Slightly
- Moderately
- Quite a bit
- Very much
- Extremely

I felt very compassionate.

- Not at all
- Very slightly
- Slightly
- Moderately
- Quite a bit
- Very much
- Extremely

I remained coldhearted throughout the experience.

- Not at all
- Very slightly
- Slightly
- Moderately
- Quite a bit
- Very much
- Extremely

I felt emotionally involved.

- Not at all
- Very slightly
- Slightly
- Moderately
- Quite a bit
- Very much
- Extremely

To what extent do you agree with the following statements?:

The kindergarten seemed realistic to me.

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Somewhat agree
- Strongly agree

I felt as though I was actually there in the kindergarten.

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Somewhat agree
- Strongly agree

I felt that the kindergarten was consistent and coherent.

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Somewhat agree
- Strongly agree

Please select answer: Slightly agree

- Strongly disagree
- Somewhat disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree

To what extent do you agree with the following statements?:

I perceive that the organisation which built the kindergarten is trustworthy.

- Not trustworthy at all
- Low level of trust
- Neutral
- High level of trust
- Completely trustworthy

To what extent is helping a kindergarten in South Africa relevant to you?

- Not at all relevant
- Slightly relevant
- Moderately relevant
- Very relevant
- Extremely relevant

Do you feel the need to support the kindergarten?

- Not at all
- Slightly
- Moderately
- Very much

How would you rate the authenticity of the organisation which built the kindergarten?

- Not at all authentic
- Slightly authentic
- Somewhat authentic
- Moderately authentic
- Very authentic
- Extremely authentic

The norms and values of the organisation which built the kindergarten align with my personal values.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Congratulation! By filling out this survey, you will be automatically entered into a prize draw for a chance to win 100 euros. If you are the lucky winner, you must now specify the amount you want to donate to the kindergarten, which will automatically be deducted from the total amount. Please note: Once you decided the amount, you can't change it afterwards.

How much would you be willing to donate?

0 10 20 30 40 50 60 70 80 90 100

Please choose a donation amount

How old are you? (in Years)

How do you describe yourself?

- Female
- Male
- Non-binary / third gender
- Prefer not to say
- Other

What is the highest level of education you have completed?

- Abitur
- Some University but no degree
- University Bachelors degree
- Graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS etc.)
- Prefer not to say

What is your gross annual household income in Euros? (Salary without any tax deductions)

- Less than 25,000 Euros per year
- 25,000 - 49,999 Euros per year
- 50,000 - 99,999 Euros per year
- 100,000 - 199,999 Euros per year
- More than 200,000 Euros per year
- Prefer not to say

How would you describe your political orientation?

- Left-wing
- Center-left
- Center
- Center-right
- Right-wing

Would you sign up for a newsletter to receive updates from the kindergarten?

- Yes
- No
- I don't want to answer this question

Would you volunteer in this kindergarten?

- Yes
- No
- I don't want to answer this question

Did you ever use a VR-glasses before?

- Never
- Yes, once
- Yes, I used it a couple of times
- Yes, I use it regularly

How did you feel while wearing the VR glasses?

- Unchanged
- My body felt weird
- I felt sick

Have you been to South Africa before?

- No
- No, but I want to go
- Yes
- Yes, a couple of times