Fostering Empathy With 360-Cinematic VR: Analyzing the Multidimensional Construct of Empathy and Perceived Resonance

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Abstract

Virtual reality (VR) has been referred to as an "empathy machine" because it may enhance levels of emotional and cognitive empathy. However, there is a lack of studies examining whether a didactic approach to the co-creation of 360-cinematic VR experiences leads to enhanced empathy. In this study, students in a lower secondary school in Norway role-played ethically complex situations occurring in authentic classroom settings, involving chauvinistic bullying, group-based ostracism, or the use of derogatory or sexist language. The simulations were recorded using 360-degree cameras and then shown to their peers, who viewed the simulated scenarios through head-mounted displays (HMDs) or computer screens. Following the 360-cinematic experiences, group discussions were conducted, and data from these, along with subsequent group interviews, have been analysed thematically to detect patterns of empathy derived from M. H. Davis' multidimensional theory of empathy. The results suggest viable connections between first-person perspectives in 360-cinematic simulations and empathy enhancements, specifically in terms of Perspective-Taking (PT), Emotional Concern (EC), Fantasy (FS), and Personal Distress (PD). The study also demonstrates that didactic approaches involving the co-creation of ethically complex scenarios in VR may foster moments of resonance, aligning with Hartmut Rosa's conceptions of being affected, responding, being transformed, and experiencing the unpredictable.

Keywords: *Virtual reality, digital didactics, empathy*

1. Introduction

In Norway, the percentage of students reporting that they have been victims of bullying has been on the rise. According to "Elevundersøkelsen", an annual national survey of school satisfaction among Norwegian elementary and secondary students, 12 percent of 12- to 13-year-olds and 11 percent of 15- to 16-year-olds report having experienced bullying behaviour from peers [1]. This aligns with an international trend indicating that over 30 percent of students worldwide have been victimized by bullying, leading to detrimental effects on "academic achievement, school dropout, and physical and mental health," according to a recent UNESCO report [2], [3]. Various educational programs and research initiatives have been developed to prevent bullying behaviours [4], and studies have shown that developing cognitive and affective empathy is negatively correlated with bullying behaviour and victimization [5], [6]. Although these initiatives have seen some success [7], there is a persistent call for innovative ways to implement measures to reduce the prevalence of bullying in schools [8].

Over the past few years, numerous studies have explored the potential of virtual reality (VR) in enhancing empathic responses [9, 10]. Empathy has been referred to as "the ability to comprehend and respond to the emotions, thoughts, and experiences of others" (11), implying an ability to understand and emotionally resonate with others' perspectives. VR has been utilized to enhance cognitive empathy through perspective-taking [11, 12], as virtual 360-degree scenes provide viewers with vivid visual information, depicting detailed and realistic portrayals of the protagonists' situations [13, 14]. However, there is debate about whether VR can truly enhance cognitive empathy, as perspective-taking demands effortful mental engagement, requiring viewers to imagine others' experiences. In contrast, VR experiences are often claimed to be limited to evoking emotional responses in viewers [10]. These findings confirm that empathy is a two-dimensional construct, comprising both cognitive and emotional elements. However, the multidimensional view of empathy developed by M. H. Davis [15, 16] and represented in the Interpersonal Reactivity Index (IRI) is recognized as the gold standard in empathy measurement [17]. Davis' model involves four dimensions: perspective-taking (PT), emotional concern (EC), fantasy (FS), and personal distress (PD). Radianti et al. recently conducted a study that quantitatively utilized the IRI model to measure empathy enhancements following exposure to VR-based content [18]. However, their findings provide only vague evidence of empathy improvements in conjunction with Davis' multidimensional construct, suggesting a need for a deeper, qualitative approach to explore whether the use of VR-based teaching-learning resources can lead to empathy enhancements that align with Davis' multidimensional construct.

This study examines whether the educational use of immersive virtual environments (IVEs) that involve ethical dilemmas can enhance empathy, in accordance with Davis' multidimensional empathy model. Specifically, it addresses the following research questions: In what ways can co-creating and engaging with cinematic VR experiences involving ethically complex situations foster empathic responses among lower secondary students in a Norwegian classroom? (RQ1). Can co-creating VR-based teaching and learning resources create moments of resonance for the students? (RQ2).

To answer these questions, we collaborated with students at a lower secondary school in southern Norway to co-create, experience, and debate the content of cinematic VR-based videos. The study formed an integral part of the school's thematic focus on ethics in the Religious Education (RE) subject. The co-creation process aimed to develop realistic virtual scenarios and recognized the importance of involving students in designing personalized virtual experiences. This aligns with research that calls for interventions that include users in the design of ecologically valid virtual experiences [10].

The term 'cinematic VR' denotes an experience in which users wear head-mounted displays (often referred to as VR headsets) that enable them, by turning their heads, to gaze around in a virtual or simulated world of moving images [19]. This conceptually and technically differs from 'interactive VR,' where users can interact directly with the narrative by manipulating protagonists or trajectories virtually [20].

The novelty of this contribution lies in the co-creative design process, along with a qualitative analysis of the students' responses, employing a typological thematic analysis derived from Davis' multidimensional construct of empathy.

2. Research Context

Empathy is regarded as an essential human skill that promotes prosocial behaviour and well-being while also moderating violent or prejudiced conduct [21], [22]. The term originates from the German word "Einfühlung," which translates to "feeling into" [17]. This aligns with the core value in the Norwegian curriculum for Religious Education (RE) known as "Ethical reflection," which states that students should develop "evne til innlevelse," translated as "ability to feel into" or "capacity for empathy" [23]. Another core value, "To be able to take others' perspectives," emphasizes that students should cultivate their own viewpoints and values as they engage with others [23]. Central to these core values is the idea that enhanced empathy and perspective-taking can foster mutual respect, interest, and, consequently, cultural awareness and sensitivity [23].

2.1 Empathy as a Multidimensional Construct

Understanding empathy as a two-dimensional construct, cognitive empathy refers to the mental ability to comprehend the perspectives or emotions of another person, often described as perspective-taking. Emotional empathy, on the other hand, signifies the capacity to be affected by, and even share, the feelings of someone else [17]. In Davis' multidimensional model, four dimensions of empathy are outlined as follows: Perspective Taking (PT) involves the ability to adopt the psychological viewpoint of others; Fantasy (FS) measures the tendency to be transported by imagination into the feelings and actions of fictional characters in books, movies, and plays; Empathic Concern (EC) assesses "other-oriented" feelings or sympathy and concern for unfortunate individuals; and Personal Distress (PD) measures the extent to which "self-oriented" feelings of personal anxiety and unease arise in tense interpersonal settings [15]. In his article "Measuring Individual Differences in Empathy: Evidence for a Multidimensional Approach" [16], Davis presents empirical evidence for connections between these four empathic dimensions and five related constructs: social competence and interpersonal functioning, self-esteem, emotionality, sensitivity to others, and intelligence. He finds a correlation between PT and the capacity for non-egocentric behaviour, as PT enables "an individual to anticipate the behaviour and reactions of others, thereby facilitating smoother and more rewarding interpersonal relationships" [16]. Since PT is negatively related to social dysfunction, higher self-esteem naturally follows, and PT is even associated with lower levels of anxiety and insecurity and implies a "selfless concern for the others' feelings and reactions" [16]. Regarding FS, Davis argues that individuals with high degrees of fantasy abilities are "more susceptible to emotional responses and thereby exhibit greater sensitivity" [16], both self-oriented and other-oriented. FS is even closely related to verbal intelligence. The dimension of EC is linked to high levels of selflessness and concern for others and is negatively associated with boastfulness and egotism. However, EC may also be connected to shyness and social anxiety. Lastly, PD correlates with social dysfunction, as individuals with high levels of PD tend to be "more shy, more socially anxious, and less extraverted" [16]. This is also interrelated with low levels of self-esteem and high levels of emotional vulnerability and chronic fear, as these individuals are impacted by a concern for the self as the object of others' evaluations.

Following Davis' multidimensional perspective on empathy, a hierarchical structure of empathic dimensions emerges, with PT at the top. This dimension is linked to social competence, high self-esteem, and low levels of vulnerable emotionality. At the opposite end, we find PD, as this empathic dimension is associated with social dysfunction, low self-esteem, and chronic fearfulness. In the middle, both FS and EC relate to pro-social (selfless sensitivity to others) and dysfunctional

(shyness and social anxiety) characteristics. However, Davis notes that high individual levels of PT do not necessarily result in prosocial action, while high levels of EC seem to facilitate it. This emphasizes that the four components of empathy should ideally work together to foster prosocial behaviour in an individual.

2.2 VR and Empathy Enhancement

VR has been hailed as the ultimate "empathy machine," as it provides users with an immersive experience of being in someone else's situation [24]. Praised for its unique ability to convey a sense of immersion, interaction, and user involvement, VR allows users to experience virtual scenarios and locations from a first-person perspective, often facilitated by a head-mounted display (HMD). Across various academic disciplines, including medicine, psychology, social care, and teacher education, studies have demonstrated the effectiveness of virtual reality-based resources in fostering empathetic responses among users. In a meta-analysis of studies that evaluated empathy measures before and after VR use, Ventura et al. [17] found statistically significant evidence that VR can effectively enhance perspective-taking, specifically empathy toward outgroup members. These findings are supported by a recently published scoping review of VR interventions designed to induce empathy [26]. However, in 2021, Martingano et al. conducted a meta-analysis showing that virtual reality may improve emotional but not cognitive empathy, arguing that the development of cognitive empathy requires effortful mentalizing, "such as using one's own imagination to construct others' experiences" [10]. According to Martingano et al., cognitive empathy is typically developed through reading fiction or acting, as the reader or actor must interpret the fictitious characters' motives and intentions. They maintain that VR elicits emotional empathy, as the vivid and immersive virtual scenes explicitly display the characters' thoughts and feelings, affecting viewers emotionally but not cognitively [10]. Since cognitive and emotional empathy seem to develop separately, Martingano et al. advocate for a dual approach to enhancing empathy, incorporating both cognitive and emotional aspects—a so-called "two-pronged" approach. This could be achieved by adding mentalizing tasks to the VR experience, such as asking "how a virtual person is thinking or feeling, asking them to predict what to do next, or explaining why they acted as they did" [10]. They even call for interventions that involve users in designing more personalized and, therefore, ecologically valid virtual experiences [10].

2.3 Empathy and Resonance

The meta-analyses of Trevena et al. [24], Ventura et al. [17], and Martingano et al. [10] acknowledge that the advantage of utilizing VR to enhance empathy lies in its technological affordances, such as the sense of presence, immersion, embodiment, and interaction. The concepts of empathy and presence are regarded as interconnected aspects of the same phenomenon, as they imply "thoughts and feelings related to an imagined experience and the projection of the self into the experience of another person." [17] Approaches to empathic enhancements should encompass both cognitive and emotional aspects, perceived in imaginative and affective ways. These may be conceptualized as empirical examples of what the German sociologist Hartmut Rosa refers to as "moments of resonance" [27]. Rosa explains the occurrence of perceived resonance as a fourfold process comprising moments (Ge. Momente) of affection, self-efficacy, transformation, and uncontrollability [27]. Initially, resonance is perceived as being affected (Ge. Affizierung) or touched (Ge. Berührtwerden) by people, incidents, stories, or music, either emotionally or existentially. Experiencing such moments presupposes a certain individual openness or vulnerability (Ge. Erreichbarkeit), and even a willingness to be reached. Second, a response is triggered, either as engagement, agency, or personal investment (Ge. Selbstwirksamkeit). Third, something in the person changes or is transformed, whether it be values, understanding, or attitudes (Ge. Anverwandlung). Lastly, Rosa emphasizes that experiences of resonance are unpredictable (Ge. *Unverfügbarkeit*). If someone tries to control the resonance instrumentally, it vanishes.

3. Methodology

Students from two lower secondary school classes (N = 45) and their respective teachers (N = 2) participated in the study. Both were selected through convenience sampling, as their school was enrolled as a collaborative partner in a joint project funded by a grant from the University of Agder to explore the benefits of using VR to enhance empathy. Since the study aimed to investigate both the process and outcomes of co-creating VR-based learning resources to foster empathy, an under-explored area of research, a qualitative and exploratory research design was employed.

3.1 Co-creation and Implementation

The project was initiated with a joint workshop that included the two class teachers, a university-employed filmmaker, a master´s student, and the author of this paper. A plan was outlined that comprised three phases of the project: an initiating phase of co-writing manuscripts, the film production, and an intervention where the students would engage with the VR productions. During the first phase, students worked in groups to write manuscripts about everyday scenarios involving ethical

dilemmas occurring at school. These included written narratives of chauvinistic bullying, group-based ostracizing, or use of derogatory or sexist language. In the second phase, five of these scenarios were selected, and several students participated as actors in the production of the videos, collaborating with the university-employed filmmaker on the project. In the first 360-video, the viewer observes a group of female students walking down an aisle at school. Groups of male peers stand in clusters along the aisle, and some of them deliver sexualized comments to one of the passing girls. A peer female in the group responds verbally to the harassment by yelling back at the boys, defending the girl who was subjected to the sexualized comments. In the second, the viewer witnesses two female students walking down a school corridor. They converse about one of them having been filmed naked in the wardrobe, and that the video has been circulated on a social media platform. As they pass a group of male peers, one of them asks if he can "see more." The girls then continue their stroll down the corridor, bewildered. In the third video, we follow a single female student as she wanders down a hallway at school. Again, she is assaulted with sexual comments, but this time no one responds, including herself. Instead, she continues to walk down the aisle, closing in on a group of teachers on recess supervision duty who are busy scrolling their smartphones. In the fourth video, the perspective shifts as the camera adopts the protagonist's view (a girl named "Sarah"). Sarah is witnessing a peer group planning a weekend party. When Sarah's friend joins the group, it is revealed that Sarah is not invited to the party. In the fifth video, the same scene unfolds as in the fourth video, but this time Sarah's friend intervenes and asks the party hostess if Sarah can be invited too. Upon rejection, Sarah's friend states that she refuses to come to the party and suggests arranging her own party, to which Sarah will be invited. None of the other group members agrees to go to the alternative party, though.

In the third phase of the project, the students experienced the five 360-degree videos, and each screening of a 360-degree video was followed by group-based dialogues focusing on ethical reflection. The first and third 360 videos were viewed on 2D screens, using the students' laptops. The second, fourth, and fifth videos were experienced using head-mounted displays (HMDs). In either mode of viewing, students could pan around the 360-degree scenes by using the integrated mouse in the 2D viewings or by physically turning their heads using the HMD. Fifteen Pico G3 VR headsets were used in the intervention. After each viewing, the students were divided into groups of three or four, and the group leaders, consisting of the two class teachers, the employed filmmaker, two master's students, and the author of this article, engaged the students in ethical reasoning, deploying a semi-structured questionnaire and asking questions like: "What is the ethical dilemma in this situation?", "Who are the key actors in this ethical dilemma?", "Which courses of action are available to the characters?", "How do you think it feels to be the person who is subjected to chauvinistic bullying or group-based ostracizing?" "Do you feel like helping this person? Why or why not?".

All group discussions (N = 31) were recorded and subsequently transcribed. Additionally, group interviews (N = 7) were conducted with students and teachers, focusing on their experiences and perceptions, as they had co-created and engaged with VR-based resources. Forty-five students participated in the co-creation process, experiencing and engaging with the immersive materials. Thirty-seven of these students consented to participate in the research study, allowing the recorded materials to be analysed. The data collection and procedures of the study received ethical approval from the Norwegian Agency for Shared Services in Education and Research (SIKT), the national authority responsible for data protection in research.

3.2 Typological Thematic Analysis

The transcribed data was then analysed using the principles of a theoretically driven thematic analysis, employing NVivo software. According to Braun & Clarke, a theoretically driven analysis is characterized by pre-established theoretical constructs, providing "the lenses through which to read and code the data and develop themes" [28]. In this study, the lenses used were the four-dimensional construct of empathy developed in Davis' IRI model. The IRI model is a report measure comprising 28 self-assessment questions that focus on selected aspects of the four empathic dimensions, allowing users to assess their empathy along a Likert scale [15]. In this study, three central questions that correspond to each of the four dimensions and that are relevant to the simulated and co-created stories were selected to inform operational criteria for the typological thematic analysis:

Empathy dimension	Guiding explanation	Corresponding IRI-questions
Perspective taking (PT)	I put myself in the participants' shoes in the simulated story.	8. Before criticizing somebody, I try to imagine how I would feel if I were in their place. 11. I sometimes try to understand my friends better by imagining how things look from their perspective. (PT) 25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while. (PT)

Fantasy (FS)	I was involved in the feelings of the participants in the simulated story.	5. I really get involved with the feelings of the characters in a novel. (FS) 16. After seeing a play or movie, I have felt as though I were one of the characters. (FS) 23. When I watch a good movie, I can very easily put myself in the place of a leading character. (FS)
Emotional Concern (EC)	I felt sorry for the protagonist in the simulated story.	2. I often have tender, concerned feelings for people less fortunate than me. (EC) 9. When I see someone being taken advantage of, I feel kind of protective towards them. (EC) 20. I am often quite touched by things that I see happen. (EC)
Personal distress (PD)	I felt bad when I experienced the simulated story.	6. In emergency situations, I feel apprehensive and ill-at-ease. (PD) 10. I sometimes feel helpless when I am in the middle of a very emotional situation. (PD) 17. Being in a tense emotional situation scares me. (PD)

Table 1. Empathy dimensions employed in the typological analysis (the numbered questions are identical with the numbers in Davis' IRI-model).

As the reflective dialogues were not explicitly designed to address the questions listed above regarding the four-dimensional construct of empathy, the analysis employs a latent design, aiming to explore the underlying meaning in relation to the multidimensional aspects of empathy. Therefore, the analysis exhibits characteristics of a constructionist approach [28], intending to create themes by interpreting the data in conjunction with Davis' theory of empathy. The analytical process has also been influenced by A. Hatch's descriptions of typological analysis, implying an identification of patterns that support Davis' theory, as well as a search for nonexamples and contradictions [29]. The subsequent group interviews have been analysed inductively, that is, without a guiding theory, seeking patterns and themes that condense and synthesize the students' experiences.

4. Results

In the following passages, the results of the analysis of the reflective dialogues (4.1-4.4) and group interviews (4.5) are elaborated, following the methodological principles outlined above.

4.1 Perspective Taking

As each 360-video displayed multiple protagonists and participants, students could adopt several perspectives in the reflective dialogues. First and foremost, the students demonstrated an ability to adopt the victims' perspectives, identifying with the precariousness of the victimized protagonists while acknowledging the potentially long-term and devastating effects of verbal harassment or intimidation. They even admitted that being harassed verbally might contribute to low self-esteem and loneliness. One of them stated: "I think it's very painful. I think it really sticks with you. Deeply. Maybe even for years afterwards. […] eventually you start doubting yourself and others […]." Considering the perspective of the peer observers, they argued that standing up for the girl being harassed would be the right and ethical choice. They interpreted the behaviour of the harassing peers as an attempt to be popular, funny, or tough. The students emphasized that if the bullies were not corrected, their misbehaviour would most likely continue. However, they admitted that intervening might come at a high cost, as they would risk becoming unpopular or subject to bullying themselves. Many students, therefore, confessed that they would prefer to remain silent bystanders if bullying occurred in real life, expressing their fears of being ostracized. The same students recognized that passiveness is another form of consenting to the bullying. Nonetheless, the fear of being targeted themselves prevented them from taking any further action. A recurring theme in all the videos is that many of the students would be more likely to refrain from intervening in the bullying if the victim were not a close friend or had previously caused them personal harm.

4.2 Fantasy

Many students stated that they identified with the feelings of the protagonist experiencing harassment or ostracism in the simulated stories. Describing the feelings arising in the girl who was assaulted while passing through the hallway in the third video, one of the students remarked: “It feels pretty unsafe and maybe even a bit gross." After experiencing the various simulated scenes, the students described emotions of being unsafe, disturbed, upset, scared, shocked, or sad, or, more explicitly, “having a knot in the stomach.” They identified with the girl being harassed with sexual comments in the hallway, feeling hurt or lonely, as well as with the fear of the girl whose intimate video circulated. When approached as the person who was not invited to a party in the virtual simulation, they easily put themselves in the shoes of the outsider, sharing her feelings of distress and rejection.

4.3 Emotional Concern

Several students felt sorry for the protagonists who experienced verbal harassment or exclusion in the simulated stories. Reflecting on the situations afterward, they expressed a sense of responsibility to intervene in similar circumstances, either by comforting the victim, defending her against the offenders, or by trying to include her. Their motivation to help stemmed from a desire to alleviate the victim's distress or assist her in resolving the problematic situation. Several even pointed to their domestic learning as a reason to intervene if someone gets harassed. However, the fear of being excluded held them back. Intervening could be even more difficult if popular peers carried out the harassment, as one of them stated: “I would have wanted to [help], but it's not always that easy. […] You might not be as well-liked by the friends you're with.” Again, they expressed a strong desire to help if one of their friends had experienced harassment, but they were more hesitant if they did not have a close relationship with the victim.

4.4 Personal Distress

Watching the simulated situations even created feelings of apprehensiveness and helplessness in the students. These emotions were often connected to the role of being a bystander, observing peers suffer yet feeling unable, or even unwilling, to intervene due to fear of potential reprisals. When asked what might happen if he intervened in a bullying situation, one student stated: “You could’ve been yelled at in return — that they’d talk back and say mean things about you." They openly described the tension between the desire to help on one side and being restrained by anxiety on the other, as intervening might lead to a loss of reputation or social standing, or even result in being treated similarly to the victim. When experiencing the perspective of the simulated victim in the fourth and fifth videos, the personal distress was further tied to feelings of unease and distress, feeling excluded from a party and being unable to remedy the situation, as inviting oneself to a party is not seen as appropriate peer behaviour.

4.5 Perceived Realism and Presence

Most students found the VR experiences engaging due to the intense sense of realism and presence in the simulated scenes. When asked whether watching the situation with an HMD rather than on a PC screen was preferable, one student replied: "[Using an HMD] you kind of got more of a feeling—or an urge—that you should say something, you know. Unlike when you were just looking at a computer screen, because then you were sort of, like, zoomed out, and it felt like watching a movie. But when it was actually happening around you, it was […] different." Several students pointed to the fourth and fifth videos as the most effective at eliciting feelings of “being there,” referring to the first-person perspective adopted by the viewer in these scenes. The students also attributed their sense of realism to their active involvement in scriptwriting and role-playing, as the simulated scenes were inspired by actual situations occurring at their school. However, some students found that their active participation in creating the 360 videos weakened their perception of realism, as they already knew the plot and the participating actors. With each video lasting only between 40 and 60 seconds and being viewed only once, some students even stressed the need to watch the videos multiple times to gain a better understanding of the narratives. Nonetheless, several students expressed that the process of co-creation, engagement with, and evaluation of the simulated VR experiences had changed how they would likely respond in similar ethical situations later in life. They expressed a desire to continue using didactic approaches that incorporate VR-based resources, as they perceived these as offering more realistic, engaging, and authentic learning experiences than they were used to.

5. Discussion

Aligning with the first research question (RQ1), the analysis reveals that co-creating and engaging with cinematic VR experiences involving ethically complex situations can foster empathetic responses in students across the four dimensions of empathy outlined in Davis’ construct. The results indicate that the students' perspective-taking (PT) was stimulated as they considered the various and conflicting viewpoints of the protagonists and participants in the simulated stories, thereby developing their mentalizing capabilities. The students exhibited explicit signs of emotional concern (EC), expressing a desire to help harassed victims in similar situations. Their fantasy (FS) was encouraged as they

identified with the protagonists, sharing their emotions while immersed in stressful scenarios, and they experienced and elaborated on the personal distress (PD) associated with being bystanders in peer bullying dilemmas. These results suggest that eliciting both emotional and cognitive empathic responses through carefully designed didactical approaches in empathy enhancement programs is feasible. If the visceral perspectives gained in the VR experiences are further explored in reflective, mentalizing dialogues, a two-pronged approach seems achievable, thereby answering the call of Martingano et al.'s call to explore such approaches further [10].

However, the results also reveal inconsistencies with Davis' theory of empathy. While Davis describes personal distress (PD) as a potentially non-social dimension of empathy, being self-oriented rather than other-oriented, leading to emotions of helplessness and apathetic fear, the VR experiences, along with the subsequent group discussions, enabled the students to uncover their reactions to bullying behaviour, mentalizing about their own and others' potential actions, and thereby proposing alternative and appropriate future behaviours to themselves and others. Thus, the VR experience provided access to perspectives and affections that were both self- and other-oriented, potentially guiding them toward prosocial behaviour. The combination of co-creation, engagement with, and mentalizing about the simulated situations appeared to open pathways to both affective and cognitive dimensions of empathy. Allowing students to recognize and anticipate feelings of being unsafe, disturbed, or upset on behalf of the victims in VR videos inspired them to assist their harassed peers, both in the simulated 360 stories and in real life, thereby indicating a possible connection between FS and EC, which is unanticipated by Davis' theory. This is promising for future educational approaches aimed at eliciting empathy in Norwegian Religious Education (RE), suggesting that the prospect of taking others' perspectives and the ability to "feel into" (Ge. Einfühlen) may be integrated within virtual reality-enabled educational designs. Although many students explicitly preferred experiencing 360-cinematic stories using an HMD rather than a PC screen, this preference did not seem to impact their subsequent ability to adopt the participants' perspectives. However, the results suggest that it was easier for the students to take on the protagonist's perspective when the focus shifted to the first-person viewpoint of the protagonist in videos 4 and 5.

Addressing the second research question (RQ2), the findings of this study align with Hartmut Rosa's concept of resonance. The ability to connect and respond, both emotionally and cognitively, to ecologically valid yet simulated situations may create moments of resonance. According to Rosa, this means being affected (Ge. Affizierung) or touched (Ge. Berührtwerden). The results indicate that experiencing virtual reality-enabled situations may evoke both openness and a sense of vulnerability (Ge. Erreichbarkeit), allowing for sensations that would otherwise be more challenging to approach. The students responded to the VR experiences in their own voices to reflect and mentalize (Ge. Selbstwirksamkeit) on the ethically dense situations. Some explicitly stated that the entire process of co-creation, engagement, and evaluation contributed to a change in how they might react in similar situations (Ge. Anverwandlung).

However, the irony of Rosa's concept of resonance is that it cannot be controlled, not even in a didactic setting. The subsequent dialogues were part of ordinary religious education (RE) sessions, and participation in them was not considered voluntary, although being part of the research project obviously was. Given this compulsory precondition and the fact that the conversations were partly led by researchers unknown to the students, they might have perceived the task as one focused on producing correct answers rather than as an invitation to engage in ethical exploration. Experiences of resonance are unpredictable (Ge. Unverfügbar) according to H. Rosa, and it is uncertain to what extent some of the students were either affected, touched, or changed during the co-creation or dialogic process. Re-experiencing the scenarios in which they had participated as actors may even have spoiled their perception of resonance. A focus on their own and their peers' appearance and conduct may have distorted the transformative and empathic potential of the 360-degree scenes for some students.

6. Conclusion

The results indicate that co-creating emotionally charged VR experiences, followed by reflective dialogues, may elicit empathetic responses and moments of resonance, thereby offering a promising pedagogical approach in both Religious Education and more broadly. Future studies on empathy enhancements with VR should consider separating the group of students acting in the 360-degree scenes from those experiencing the simulated scenarios with VR. As some of the 360 videos were perceived as too short to evoke a sense of presence or resonance, future studies should investigate whether longer 360-cinematic VR experiences, allowing for repeated viewings and preferably designed as longitudinal studies, might foster similar perceptions of empathy and resonance. Future studies should even consider employing Davis' IRI model quantitatively to evaluate potential empathy enhancements when co-creating and engaging with ethically complex VR scenarios.

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