

Research Title

**Scenario-Driven Virtual Reality Game for Dementia
Education Among Healthcare Students**



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UNIVERSITAS AIRLANGGA

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Clinical Trial

Title: Scenario-Driven Virtual Reality Game for Dementia Education Among Healthcare Students: Protocol for a Four-Arm Study

Study Description

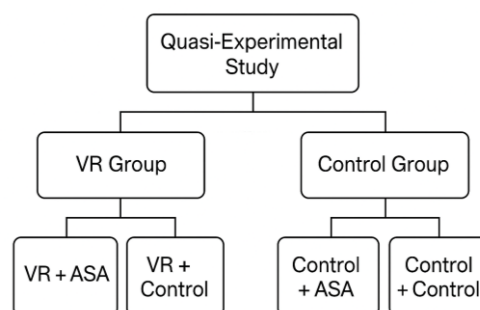
- **Terminology Clarification:**
In the previous study (NCT06629844), the term 'virtual reality (VR)' referred to a 360-degree video viewed through a VR headset. This format offered an immersive experience but was non-interactive. In contrast, the current study uses an 'ASA VR' intervention, which is a scenario-driven, interactive virtual reality simulation. Participants take part in role-playing with an artificial intelligent (AI) character representing a person living with dementia. This distinction is crucial for understanding the study design and results, as the cognitive and experiential demands of the two formats differ greatly.

- **Brief Summary:**

This nested 2x2 factorial quasi-experimental design study focuses on Indonesian nursing students and aims to examine the effectiveness of scenario-driven virtual reality (VR) dementia educational programs. The study uses a four-arm design to evaluate different combinations of interventions.

The study addresses the following research questions:

What is the effect of a Scenario-Driven VR dementia education program on improving participants' attitude, knowledge, intention to help toward people living with dementia, ageist attitudes, and how do participants satisfaction of the Scenario-Driven VR dementia education program?



Participants will voluntarily join a 30-minute class education program, with each participant attending only once. The program, integrated into the faculty's dementia-related courses, will be structured around a series of components, including introduction, Scenario-Driven VR, post-program questionnaire, and conclusion.

- **Detailed Description:**

1) Research Implementation

a. ASA Program Overview

ASA VR is a scenario-driven, interactive virtual reality (VR) learning experience designed to cultivate dementia-competent attitudes and behaviors among healthcare students. Unlike the passive 360° video used in the prior study, ASA requires learners to make decisions, engage in role-play with an AI character portraying a person living with dementia (PLWD), and receive immediate, context-specific feedback.

b. Educational Concept and Design Rationale

ASA operationalizes evidence-informed instructional principles: (1) problem-centered, authentic tasks with demonstration and guided practice; (2) anchored, scenario-based learning to encourage transfer; and (3) first-person immersive perspective-taking shown to strengthen empathy in healthcare education using VR. Together, these elements aim to move learners beyond recognition-level knowledge to a situated judgment and prosocial intention.

2) Research Method

This study is randomized with parallel assignment. The study aims to evaluate scenario-driven VR dementia education programs among nursing students in Indonesia. The participants will be nursing students who are enrolled in specific semesters and courses designated for the implementation of this educational program. The study will be conducted with students in the sixth semester (third year). Participants in this study were drawn from the previous study (NCT06629844). The previous study was a quasi-experimental, two-arm design, consisting of an intervention group that received an education program using VR and a control group that attended conventional classes. In the previous study, we collected questionnaires at three time points: pre-questionnaire (T1), post-questionnaire (T2), and a follow-up questionnaire three months later (T3). In this study, we continue our research using the Scenario-Driven VR Dementia Education Program. We will conduct a randomized with parallel assignment study with four arms. The intervention group from the previous study who had prior VR experience will be divided into two groups: one receiving the Scenario-Driven VR Dementia Education Program and one serving as a control group. Similarly, the control group from the previous study will also be divided into two groups: one receiving the Scenario-Driven VR Dementia Education Program and one serving as a control group. After finish the Scenario-Driven VR Dementia Education Program we will gave post-questionnaire (T4).

All prospective participants will be assigned new ID numbers to ensure the confidentiality of their student ID numbers. Each new ID will correspond to the participant's ID number from the previous study, with the addition of a code to classify them into four groups. This approach will allow us to link participant data in the current study with data from the previous study. The protocol has been reviewed and approved by the Ethics Committee of the Faculty of Nursing, Universitas Airlangga. The Scenario-Driven VR dementia education program will not be integrated into a specific class, but will cover themes related to dementia care.

Participants will be recruited through class announcements. An overview of the research process will be provided, and detailed instructions regarding the study will be given shortly before it begins. The research team will announce the study approximately one week in advance, and recruitment will be conducted via Google Forms. Students who register will be randomly assigned into four groups. Selected participants will receive their ID numbers along with details about the program's schedule and location through a class announcement three days prior to the intervention.

On the day of the intervention, participants will attend the designated location and sign an attendance sheet using their IDs. The Principal Investigator (PI) will explain the study's stages and emphasize that participants can withdraw at any time without any consequences. Participation in the study will be entirely voluntary, and there will be no coercion. Students who agree to participate in the study will provide informed consent. Those in the program will complete a questionnaire after the intervention. Regarding recruitment, eligible participants will be identified through the previous study's data. Students registered in the selected courses for the 2025/2026 academic year. All eligible students will receive comprehensive information about the study and an invitation to participate. Both the intervention and control groups will complete post-intervention questionnaires.

The intervention group will receive the Scenario-Driven VR Dementia Education Program, while the control group will attend an online class to receive information about the study, provide informed consent, and complete the post-test questionnaire. Both the intervention and control sessions will be conducted once. Students who provide informed consent in the intervention group will attend a classroom lecture to participate in the Scenario-Driven VR Dementia Education Program and then complete a post-lecture survey (T4). The control group will follow the same timeline for completing the survey (T4).

In the previous study, students experienced a non-interactive 360° video via a headset, which likely enhanced presence and baseline attitude but required no active problem-solving. In this follow-up study, we investigate whether ASA's interactivity provides incremental value (in the form of additive or synergistic effects) beyond prior passive immersion. This design allows us to disentangle (A) the main effect of ASA and (B) whether prior 360° exposure primes learners for greater gains when interactivity is introduced.

Arms Intervention

Arms	Assigned Intervention
A four-arm post design will be employed in this study, meticulously structured to evaluate various educational approaches.	As previously mentioned, the intervention for this study will involve a scenario-driven ASA VR content designed to enhance healthcare students' attitudes toward dementia care. in which participants from a

<p>There will be four groups, strategically divided based on participants' prior engagement with a VR-based dementia education program:</p> <p>1. Arm 1: VR-Experienced + ASA VR Group</p> <ul style="list-style-type: none"> • Description: This arm includes participants who have previously engaged with a VR-based dementia education program. For this study, they will receive the full intervention, which combines the ASA VR content. • Purpose: This group helps assess the incremental benefit of the ASA content when integrated with prior VR exposure, evaluating how additional structured content enhances existing VR learning. <p>2. Arm 2: VR-Experienced + Standard Control Group</p> <ul style="list-style-type: none"> • Description: This arm consists of participants who have also previously engaged with a VR-based dementia education program. However, for this study, they will only receive the standard course material on dementia through the university's e-learning platform. They will not receive any ASA VR exposure. • Purpose: This group serves as a comparison to Arm 1, helping to isolate the specific impact of the ASA VR intervention for those with prior VR experience, by observing outcomes when no further structured intervention is provided beyond regular curriculum. 	<p>previous study are assigned to new intervention and control groups.</p> <p>The program is designed to simulate real-life dementia care situations, encourage reflection, and enhance nursing students' understanding of dementia management. Here's how the intervention and participant assignment process will generally unfold:</p> <ol style="list-style-type: none"> 1. Participant Identification Nursing students currently enrolled in the Gerontological Nursing programs at Universitas Airlangga will be identified as potential participants for this study. 2. Initial Grouping Participants will initially be categorized based on their prior involvement with the scenario-driven VR dementia education program from the previous pilot study. This will create two primary groups: those who have been previously exposed to the VR program and those who have not. 3. Subgroup Formation and Assignment Based on the initial grouping, participants will be strategically divided into four distinct arms. Within each main group (previous VR exposure and no prior VR exposure), participants will be assigned into respective subgroups without randomization to ensure balance and minimize bias: <ul style="list-style-type: none"> • Arm 1: VR-Experienced + ASA VR Group A subgroup of participants who have previously interacted with the VR-based dementia education will be assigned to receive the full ASA VR intervention. • Arm 2: VR-Experienced + Standard Control Group A subgroup of previously VR-exposed participants will be assigned to receive only standard dementia-related course material through the university's e-learning platform. • Arm 3: VR-Unexposed + ASA VR Group A subgroup of participants with no prior VR exposure will be assigned to receive the full VR ASA intervention. • Arm 4: VR-Unexposed + Standard Control Group Another subgroup of participants without prior VR exposure will be assigned to this arm, receiving only the standard dementia-related course material through the university's e-learning platform.
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<p>3. Arm 3: VR-Unexposed + ASA VR Group</p> <ul style="list-style-type: none"> • Description: This arm comprises participants who have no prior exposure to a VR-based dementia education program. For this study, they will receive the full intervention, combining the immersive ASA VR content. • Purpose: This group allows for a direct assessment of the overall effectiveness of the complete ASA VR program for students new to this type of intervention, comparing it against conventional learning for a previously unexposed group. <p>4. Arm 4: VR-Unexposed + Standard Control Group</p> <ul style="list-style-type: none"> • Description: This arm includes participants who have no prior exposure to a VR-based dementia education program. For this study, they will only receive the standard course material on dementia through the university's e-learning platform. They will not receive any ASA VR content. • Purpose: This group acts as a true control, representing the outcomes of conventional dementia education through the university's regular e-learning, for students who have not had any previous VR exposure. 	<p>4. Voluntary Participation & Informed Consent</p> <p>Prior to any intervention, the Principal Investigator (PI) will provide all potential participants with a clear and comprehensive explanation of the study procedures. Emphasis will be placed on the voluntary nature of participation, ensuring that students understand they may withdraw at any time without consequence or impact on their academic standing. Students who agree to participate will provide written informed consent. Those who choose not to participate will still receive dementia-related educational materials via the university's e-learning platform but will not be involved in the gamified educational program or structured interventions included in this study.</p> <p>5. Intervention Sessions (Single 60-minute session or standard e-learning access)</p> <p>The delivery of the intervention will vary according to group assignment:</p> <p>For Arms 1 and 3 (ASA VR Groups):</p> <p>Participants will attend a single 60-minute session, structured as follows:</p> <ul style="list-style-type: none"> • Introduction (5 minutes): A warm welcome will be extended to participants, along with a brief overview of the session's objectives and flow. • Study Briefing (10 minutes): The PI will explain the study's aims, the participants' roles, and highlight voluntary participation, confidentiality, and the informed consent process. • Intervention Implementation (30 minutes): During this segment, participants will engage with a scenario-driven Virtual Reality Dementia Game. The intervention features role-playing game where players interact with an AI that takes on the role of a person living with dementia in a virtual world. The gameplay follows a structured storyline, ensuring that the immersive VR experience directly supports the learning objectives. This active learning approach is designed to foster empathy, understanding, and appropriate attitudes toward individuals living with dementia. • Post-Program Questionnaire (10 minutes): Immediately after the intervention, participants will complete the post-
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	<p>intervention questionnaire (T4) to assess changes in outcomes.</p> <ul style="list-style-type: none"> • Closing (5 minutes): A brief summary will be provided, including an opportunity for questions and a word of thanks to the participants. <p>For Arms 2 and 4 (Standard Control Group): Participants in these arms will access dementia-related content through the university's existing e-learning platform as part of their regular curriculum. These groups will not receive a special intervention session from this study and will serve as control groups for the ASA VR program. All participant groups will complete the post-intervention (T4) questionnaires at designated times to measure the study's primary and secondary outcomes.</p>
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Analysis Methods:

After calculating descriptive statistics, chi-squared test and Student's t test will be used to examine the homogeneity of the baseline participants' characteristics between the two groups. The main analysis will be to compare the changes in the primary and secondary outcomes from T3 to T4 between the intervention and control groups using Student's t test and to estimate the effect size (Hedges' g). Small effect sizes will range from 0 to 0.17, moderate effect sizes from 0.18 to 0.43, and large effect sizes from 0.44 to 0.84 (Brydges, 2019). As post hoc analysis, the changes from T3 to T4 scores in each group will be examined using paired t test. All participants who complete the T3 and T4 surveys will be included in the analyses. To compare the scores among four time points (T1–T4) in the intervention group, a one-way repeated measures analysis of variance will be performed. Complete case analysis will be used to handle missing values. For sensitivity analysis to confirm the consistency of results in the main analysis, analysis of covariance (ANCOVA) will be conducted for the primary outcome. The following variables will be used as adjustment variables: involvement with people living with dementia, knowledge of dementia, ageism, and intention for helping behaviour.

Outcome Measures

Primary Outcome Measure:

1. Participants' attitudes toward persons living with dementia (PLWD) will be assessed using the **Attitudes Toward People with Dementia Scale**, developed by Kim K and Kuroda K. (Kim K, Kuroda K. Factors related to attitudes toward people with dementia: Development of the Attitude Toward Dementia Scale and Dementia Knowledge Scale. *Bulletin of Social Medicine*. 2011; 28(1), 43-55). The original scale was published in Japanese, and a forward-backward translation process was conducted to produce the Indonesian version of the scale.

The questionnaire consists of 14 items and is designed to evaluate participants' attitudes toward PLWD. The estimated time to complete the questionnaire is 3-5minutes.

[**Time Frame:** Immediately post-intervention (T4), on the same day, within 0–60 minutes after session end.]

Secondary Outcome Measures

1. Knowledge of Dementia

Participants' knowledge of dementia will be assessed using the **Dementia Knowledge Scale**, developed by Kim and Kuroda (2011). This scale was originally designed to measure various aspects of dementia knowledge, including symptoms, causes, progression, and caregiving strategies. The scale consists of 15 multiple-choice and true/false questions that cover a broad range of dementia-related topics. The Indonesian version of the scale was created through a forward-backward translation process to ensure cultural and linguistic accuracy. Higher scores on this scale indicate a better understanding of dementia.

[**Time Frame:** Immediately post-intervention (T4), on the same day, within 0–60 minutes after session end.]

2. Intention to Help Persons Living with Dementia (PLWD)

To assess participants' intention to help PLWD, we will use a set of four vignettes based on the study by Matsumoto et al. (2022). Each vignette presents a realistic scenario in which a person with dementia may need assistance, such as confusion in a public place, difficulty with daily tasks, or issues related to memory loss. Participants will read through each vignette and indicate their intended helping behavior on a **4-point Likert scale** (ranging from "definitely would not help" to "definitely would help"). The vignettes are designed to assess the participants' willingness to offer practical, emotional, or social support to PLWD in everyday situations. The Indonesian version of the vignettes and Likert scale has also undergone a forward-backward translation to ensure that the language and context are appropriate for Indonesian nursing students.

[**Time Frame:** Immediately post-intervention (T4), on the same day, within 0–60 minutes after session end.]

3. Ageist Attitudes Towards Older Adults

Participants' ageist attitudes will be assessed using selected items from the **Fraboni Scale of Ageism (FSA)**. The FSA is a validated instrument developed by Fraboni et al. (1990) that measures stereotypes, prejudice, and discriminatory attitudes toward older adults. In this study, a subset of key items will be adapted and translated into Indonesian version using a forward-backward translation process to ensure cultural and linguistic appropriateness. The selected items cover three main domains: Stereotyping, Social distancing, Discriminatory attitudes. Each item will be rated on a **5-point Likert scale** (1 = strongly disagree to 5 = strongly agree), with higher scores indicating stronger ageist attitudes. This measure will allow researchers to explore how underlying biases may impact students' empathy, communication, and willingness to provide equitable dementia care to older adults. This questionnaire is relevant to the study's aim of evaluating the impact of VR ASA not only on knowledge and behavior but also on deep-seated attitudes toward aging.

[**Time Frame:** Immediately post-intervention (T4), on the same day, within 0–60 minutes after session end.]

4. User Experience Questionnaire (UEQ)

To assess participants' perceptions of the VR dementia education program, we will use the **User Experience Questionnaire (UEQ)**. This questionnaire evaluates users' experiences with the VR program across several dimensions, such as attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The UEQ was used previously in similar studies and provides valuable feedback on the user experience. The Indonesian version of the UEQ, authored by Harry B. Santoso <https://www.ueq-online.org/>, will be employed to ensure the questionnaire is culturally and linguistically appropriate.

[Time Frame: Immediately post-intervention (T4), on the same day, within 0–60 minutes after session end.]

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UNIVERSITAS AIRLANGGA

Faculty of Nursing

Kampus C Jl. Mulyorejo, Surabaya 60115 Telp. (031) 5913756 Fax (031) 5913752
Website : <https://ners.unair.ac.id>, e-mail : humas@fkip.unair.ac.id

INFORMED CONSENT

Dear Participant,

We invite you to complete the questionnaire below:

Information about this study:

Title: Scenario-Driven Virtual Reality Game for Dementia Education Program

Objective: To evaluate the effectiveness of an educational program using a Scenario-Driven Virtual Reality Game to improve attitudes toward people living with dementia among healthcare students.

Principal Investigator: Dianis Wulan Sari, Faculty of Nursing, Universitas Airlangga

Contact Person: Dianis; dianis.wulan.sari@fkip.unair.ac.id

Study Duration: September 2025 – June 2026

This survey will be conducted once and will take approximately 30 minutes to complete.

We would like to assure you that:

- Your participation in this study is voluntary. You have the right to refuse or agree to participate.
- Your information will be treated anonymously and confidentially, and will not be used for any purpose other than this study.
- You may leave questions unanswered without penalty.
- Your responses will be stored in an encrypted drive and destroyed five years after publication of the study.
- Participants who are willing to provide their phone number will receive mobile credit compensation after all data collection has been completed.

Completion and return of this questionnaire will be considered as your consent to participate in this study. Once your responses are submitted, they cannot be withdrawn.

Do you agree to participate in this survey?

- ☐ Yes, I agree
☐ No, I do not agree

This statement is made to be used as necessary.