Clinical Trial Protocol
Iranian Registry of Clinical Trials

08 Nov 2026

Evaluation of the effectiveness of a mixed reality platform for teaching nervous system structures, functions, and diseases to basic medical science students: A randomized clinical trial

Protocol summary

Study aim
Evaluation of the effectiveness of a mixed reality platform in teaching nervous system structures, functions, and diseases to medical students compared to traditional methods

Design
A randomized, parallel group, non-blinded clinical trial with control group on 26 students. The rand function of Excel software is used for randomization.

Settings and conduct
10 sessions of neuroanatomy and neurophysiology education at Isfahan University of Medical Sciences using mixed reality headset and software (intervention group) and traditional teaching methods (control group).

Participants/Inclusion and exclusion criteria
Major inclusion criteria before randomization are third-semester medical students taking neuroanatomy and neurophysiology courses for the first time, having the ability to use digital tools and mixed reality headset, and being willing to participate in all intervention sessions with written informed consent. Major exclusion criteria before randomization are prior experience with similar virtual or mixed reality courses and history of neurological diseases such as epilepsy, recurrent vertigo, or balance disorders.

Intervention groups
Intervention group: Teaching of neuroanatomy and neurophysiology courses using traditional methods along with the mixed reality platform. Control group: Teaching of neuroanatomy and neurophysiology courses using traditional methods only.

Main outcome variables
Knowledge Gain Score Difference in test scores between pre-intervention and post-intervention assessments on neuroanatomy and neurophysiology using a multiple-choice questionnaire

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20251023067734N1**
Registration date: **2025-12-29, 1404/10/08**
Registration timing: **prospective**

Last update: **2025-12-29, 1404/10/08**
Update count: **0**

Registration date
2025-12-29, 1404/10/08

Registrant information

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Name of organization / entity
Isfahan University

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Iran (Islamic Republic of)

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Recruitment status
recruiting

Funding source

Expected recruitment start date
2026-10-24, 1405/08/02

Expected recruitment end date
2027-01-23, 1405/11/03

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date

empty

Scientific title
Evaluation of the effectiveness of a mixed reality platform for teaching nervous system structures, functions, and diseases to basic medical science students: A randomized clinical trial

Public title
Evaluation of the effectiveness of a mixed reality platform versus conventional methods in teaching nervous system anatomy and physiology to medical students

Purpose
Education/Guidance

Inclusion/Exclusion criteria

Inclusion criteria:
Third-semester medical students taking neuroanatomy and neurophysiology courses for the first time Ability to use digital tools and headset Willingness to participate in all intervention sessions (providing written informed consent)

Exclusion criteria:
Prior experience with similar VR/MR courses History of neurological diseases (e.g., epilepsy, recurrent vertigo, balance disorders)

Age
No age limit

Gender
Both

Phase
N/A

Groups that have been masked
No information

Sample size
Target sample size: **26**

Randomization (investigator's opinion)
Randomized

Randomization description
Simple randomization using manual lottery will be employed. On 26 slips of paper, the group assignment will be written: "Mixed Reality group" (13 slips) and "Control group" (13 slips). The slips will be folded and placed in a single container. After thorough mixing, each participant, upon entering the study, will randomly draw one slip to determine their group assignment.

Blinding (investigator's opinion)
Not blinded

Blinding description

Placebo
Not used

Assignment
Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee
Ethics committee of University of Isfahan

Street address
Research Misconduct Review Committee, Office of the Vice Presidency for Research and Technology, Vice Presidency for Research and Technology, University of Isfahan, Azadi Square

City
Isfahan

Province
Isfehan

Postal code
81746-73441

Approval date
2025-10-11, 1404/07/19

Ethics committee reference number
IR.UI.REC.1404.167

Health conditions studied

1

Description of health condition studied
Medical Education, Neuroanatomy and Neurophysiology Education

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description
Knowledge Improvement: The difference between the pre-test and post-test scores on students' knowledge of the structures, functions, and diseases of the nervous system.

Timepoint
Baseline (pre-intervention), After intervention

Method of measurement
20-point Multiple-choice questionnaire. Pre-test and post-test questions are randomly selected from the Isfahan University of Medical Sciences professors' question bank.

Secondary outcomes

1

Description
Student satisfaction score: Students report their level of satisfaction with the teaching method.

Timepoint
After intervention

Method of measurement
Five-point Likert scale. Score range: 1 (very dissatisfied) to 5 (very satisfied)

2

Description
Student motivation score: Students report their level of motivation with the teaching method.
Timepoint
After intervention
Method of measurement
Five-point Likert scale. Score range: 1 (very much) to 5 (very little)

3

Description
Neurophobia level: Students report their level of fear or anxiety about learning neurology due to the complexity and abstractness of its concepts.
Timepoint
After intervention
Method of measurement
Five-point Likert scale. Score range: 1 (very much) to 5 (very little)

Intervention groups

1

Description
Intervention group: Traditional education plus mixed reality platform: interactive 3D exploration of nervous system structures (brain regions, spinal cord, neural pathways), functions, and diseases (e.g., stroke, Parkinson's) in an immersive environment.
Category
Behavior

2

Description
Control group: Traditional teaching only, including conventional methods such as textbooks, two-dimensional atlases, educational slides, physical plastic models, and plastinated specimens (if available).
Category
Behavior

Recruitment centers

1

Recruitment center
Name of recruitment center
Department of Anatomical Sciences, School of Medicine, Isfahan University of Medical Sciences
Full name of responsible person
Mehrnoush Malekzadeh
Street address
Department of Anatomical Sciences, School of Medicine, Isfahan University of Medical Sciences, Hezar Jerib Street
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Sponsors / Funding sources

1

Sponsor
Name of organization / entity
University of Isfahan
Full name of responsible person
Babak Saffari
Street address
Vice Presidency for Research and Technology, Third Floor, Central Building, University of Isfahan, Azadi Square
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b_saffari@ase.ui.ac.ir
Grant name
Grant code / Reference number
Is the source of funding the same sponsor organization/entity?
No
Title of funding source
University of Isfahan
Proportion provided by this source
100
Public or private sector
Public
Domestic or foreign origin
Domestic
Category of foreign source of funding
empty
Country of origin
Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact
Name of organization / entity
Esfahan University of Medical Sciences
Full name of responsible person
Mehrnoush Malekzadeh
Position
Assistant Professor
Latest degree
Ph.D.
Other areas of specialty/work

Anatomy

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Full name of responsible person

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Position

Assistant Professor

Latest degree

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Person responsible for updating data

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Position

Assistant Professor

Latest degree

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Other areas of specialty/work

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Sharing plan

Deidentified Individual Participant Data Set (IPD)

No - There is not a plan to make this available

Justification/reason for indecision/not sharing IPD

The data are copyrghited by University of Isfahan

Study Protocol

No - There is not a plan to make this available

Statistical Analysis Plan

No - There is not a plan to make this available

Informed Consent Form

No - There is not a plan to make this available

Clinical Study Report

No - There is not a plan to make this available

Analytic Code

No - There is not a plan to make this available

Data Dictionary

No - There is not a plan to make this available