

Perceptions of Virtual Reality as a Training Tool in Engineering Education

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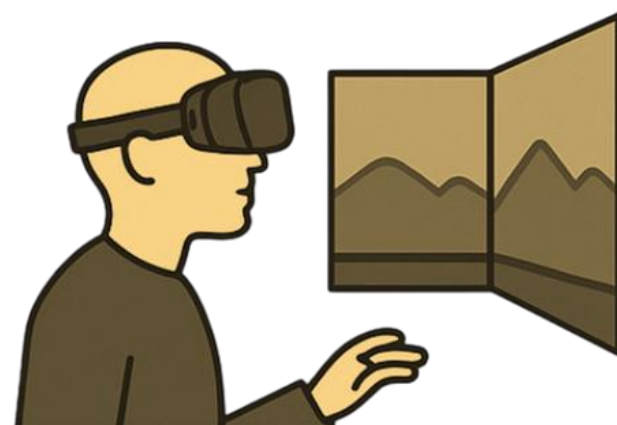
INTRODUCTION & AIM

Virtual Reality (VR) can be implemented through **non-immersive systems**, such as desktop-based simulations, or through fully **immersive environments** that use head-mounted displays. Non-immersive VR provides interaction through a standard screen, keyboard, and mouse, offering limited sensory engagement. In contrast, immersive VR isolates users from the physical environment and increases presence, realism, and experiential learning.

NON-IMMERSIVE



IMMERSIVE



Low level of immersion



High level of immersion

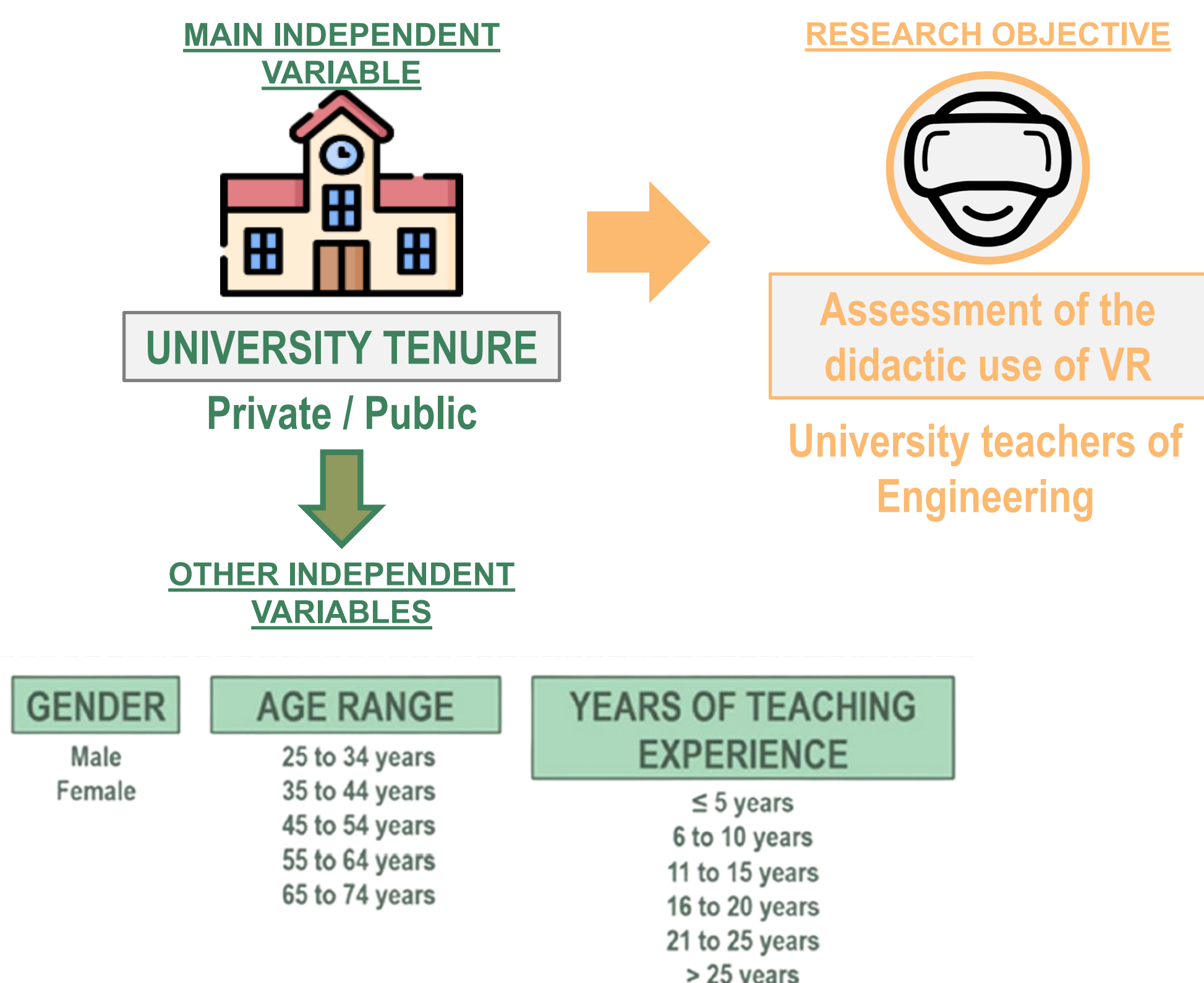


This study explores how engineering professors from South America perceive the usefulness, limitations, and didactic value of both types of VR in higher education.

METHODS

A quantitative, cross-sectional study was conducted with **279 engineering professors from 15 South American countries**. The main independent variable was university tenure (public vs. private), together with gender, age range, and teaching experience, as shown in the diagram.

Participants completed a validated 22-item questionnaire assessing six dimensions of VR use in education: **competence, usability, technical aspects, drawbacks, didactic employability, and future projection**. Data were analyzed using descriptive statistics, t-tests, MANOVA, and Cronbach's alpha for reliability.



RESULTS & DISCUSSION

ASSESSMENT OF VR

High ratings for usability, technical aspects, and didactic potential.

Subscale	Media	Standard deviation
VR Proficiency	2.76	1.25
Usability	4.19	0.92
Technical aspects	4.16	0.87
Perceived disadvantages	3.56	1.23
Future projection (IVR/NIVR)	3.91	1.04
Didactic uses	4.14	0.99

Greater perceived usefulness for laboratory practices and visualization of complex processes.

COMPETENCE GAP

Low training and teaching competence in VR.

Gap between interest and actual readiness to use it.

DIFFERENCES BETWEEN INSTITUTIONS

Private-university faculty: more favorable perceptions.

Possibly related to greater resource availability and stronger support for innovation.

Subscale	Private	Public	Interpretation
Competence	2.72	2.78	There are no significant differences
Usability	4.43	4.07	Private univ. value usability more
Technical aspects	4.18	4.16	No differences
Disadvantages	3.71	3.49	Private univ. perceive more disadvantages
Future IVR/NIVR	3.86	3.93	No differences
Didactic use	4.21	4.11	Private univ. value their educational potential more

INFLUENCE OF DEMOGRAPHIC VARIABLES

Significant differences according to gender, age and years of teaching experience.

More positive perceptions among younger faculty, teachers with fewer years of experience.

CONCLUSIONS

- Engineering faculty perceive VR—both immersive and non-immersive—as a **valuable and promising educational tool**.
- Usability, technical quality, and didactic potential** receive the highest ratings across participants.
- A clear **competence and training gap** limits effective implementation of VR in engineering courses.
- Private-university teachers** show more favorable perceptions than those in public institutions, likely due to better access to resources and innovation support.
- Demographic factors** (age, experience, gender) influence acceptance, with more positive views among younger and less experienced instructors.
- Successful VR adoption requires **structured teacher training**, improved access to **VR equipment**, and **institutional commitment** to integrating VR into curricula.