

A Review on XR in Home-based Nursing Education

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About Me

Assistant Professor at the Department of Computer Science at Blekinge Institute of Technology (BTH), Sweden.

I received my M.Sc. Degree in Computer Science in 2010 at BTH, Sweden and M.Sc. in Computer Application Technology in 2011 at Zhejiang University of Technology, China.

By the end of 2011, I joined BTH as a Ph.D. candidate. In April 2017, I received my Ph.D. degree in Computer Science.

My research interests include human-computer interaction, user experience design and evaluation, XR interaction, biometric research in behaviours and interaction, eHealth and applying XR to health-related areas.



HINTS: Human-Centered Intelligent Realities

BTH Research project co-funded by the Knowledge Foundation Research Profiles programme.

Overall Objective

In co-production with industrial partners and society, develop concepts, principles, methods, algorithms, and tools for human-centered intelligent realities, in order to lead the way for future immersive, user-aware, and smart interactive digital environments.

Core Question

How shall we design effective, efficient, and distributed analytical and computational methods for human-centered intelligent realities?

Mission

“Be a leading site in Sweden and an internationally recognized environment in future digital human-centered intelligent realities.”



A Review on XR in Home-based Nursing Education

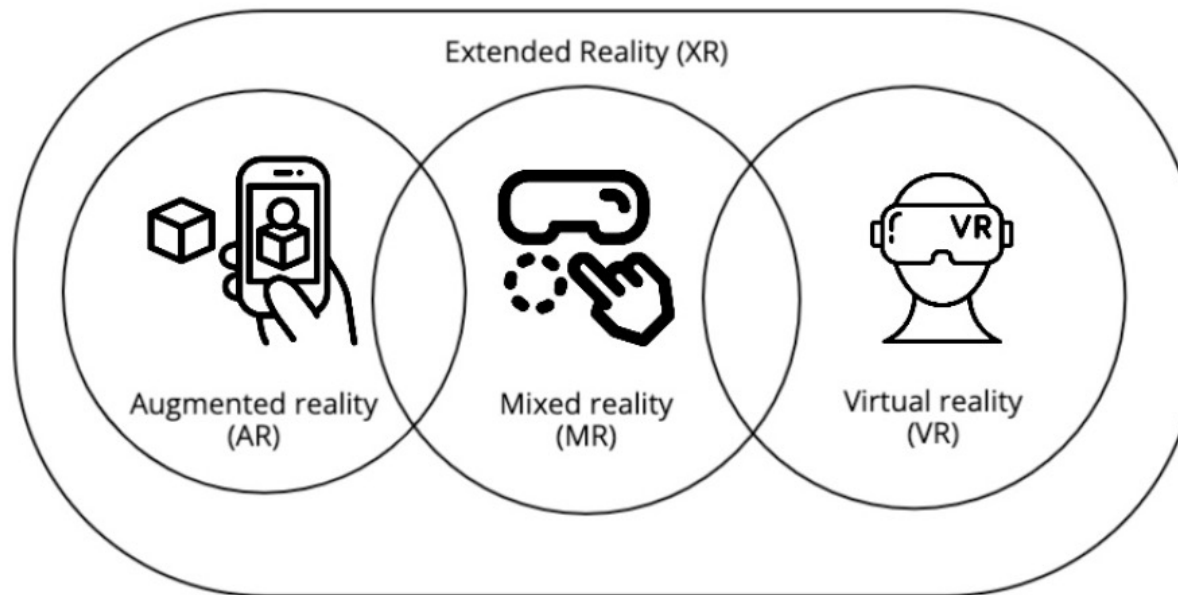


- Recent developments using extended reality (XR) technologies have allowed for increased use in healthcare
- Exploring new ways of applying ICT to support distance education
- **Aim:** Explore the current state-of-the-art on applying XR in home-based nursing education and discover its future trends
- To achieve the research goal, a systematic literature review will be performed. The research questions of this review are:
 - *RQ 1: How have XR applications been used in home-based nursing education?*
 - *RQ 2: What are the future challenges and opportunities to apply XR technologies in home-based nursing education?*



What is Extended Reality (XR)?

--an umbrella term for all the technologies that add virtual elements to the real-world environment to any extent



Method--systematic literature review

Search string:

- (“virtual reality” OR “VR”) AND (nurs*) AND (“educat*” OR ”teach*”) AND (home)
- (“augmented reality” OR ”AR”) AND (nurs*) AND (“educat*” OR ”teach*”) AND (home)
- (“mixed reality” OR “MR”) AND (nurs*) AND (“educat*” OR ”teach*”) AND (home)

Database:

PubMed, Web of Science, ACM Digital Library, IEEE Xplore and Scopus.

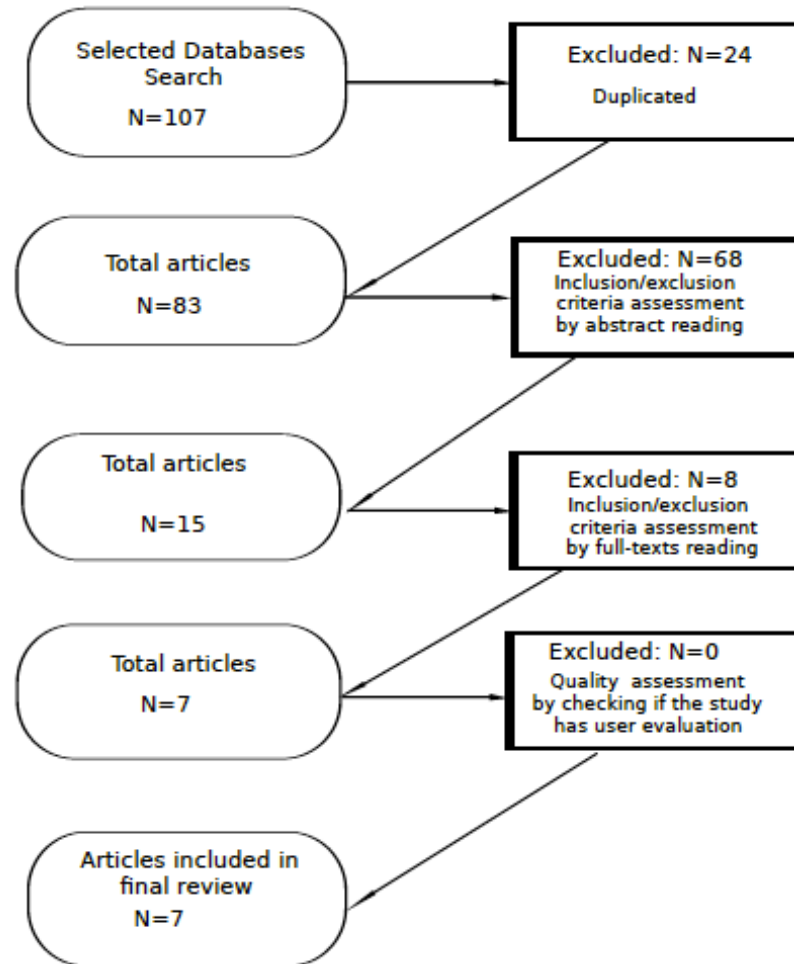
Method--systematic literature review

Inclusion and exclusion criteria

<i>Inclusion criteria</i>	<i>Exclusion criteria</i>
<i>Written in English Studies that apply XR in home-based nursing education Have available full-text version Journal articles, conference papers and book chapters</i>	<i>Not written in English Less than 5 pages Review papers</i>

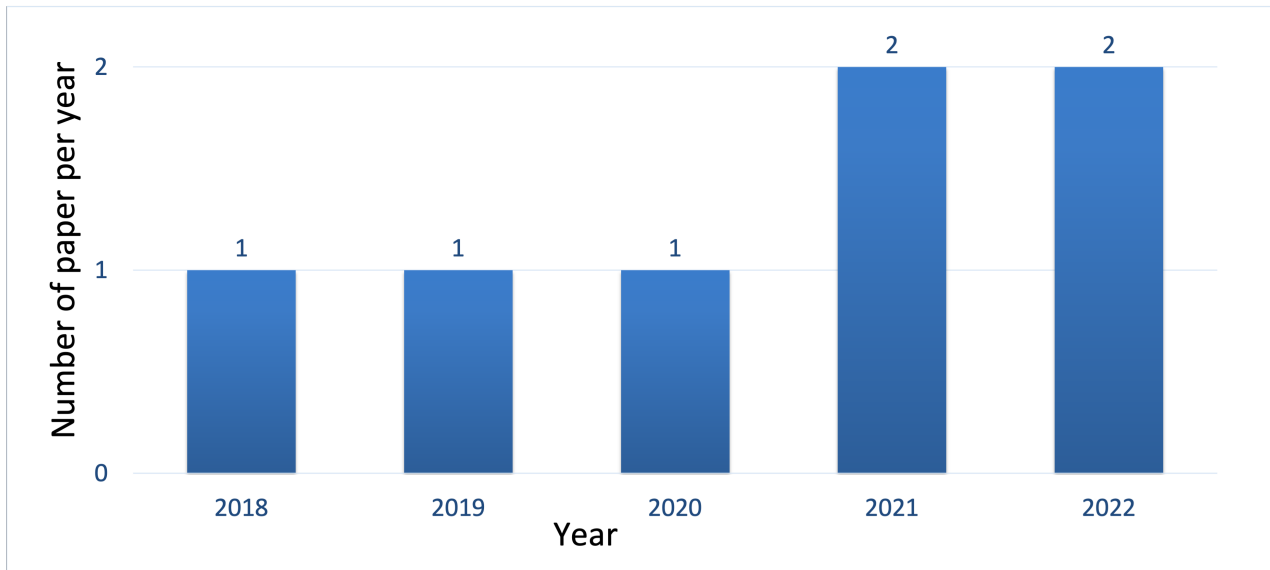
Method--systematic literature review

Processes



Results

7 papers in total



Technology	Number of papers
VR	6
AR	1

Results

Education Purposes

- Aimed to transfer medical knowledge to the targeted nursing students in their specific areas
- 3 worked on care-skills training; these skills training are not only for home-based healthcare but also apply to hospital-based care
- 4 studies are more related to home-based healthcare scenarios, with one on general home-based healthcare, elderly home-based care and Parkinson's disease and associated disorders care

Results

Study Design

- The study that applied AR technology designed a mobile AR-based game for nursing students to learn how to deal with different situations when they visit the homes of different groups of people
- Most VR applications employ immersive VR, which uses Head-Mounted Devices (HMDs) to run the applications. Some were even assisted with motion capture sensors for interaction with the VR systems
- One application, namely Nursing XR, is an integrated platform mainly based on immersive VR technology

Results

Study Evaluation

- All 7 studies include some user evaluation.
- 4 of them use surveys as the primary evaluation method.
--System Usability Scale (SUS), Gameful Experience (GAMEX), QualCare Scale
- 2 studies choose face-to-face communication methods like interviews and workshops
- 1 study conducted a user experiment as the objective evaluation method.
--eye tracking data and motion of the whole body without fingers



Discussion

- ✓ Case-simulation education could improve nursing students' empathy, confidence, and attitudes to dealing with healthcare recipients at home and cooperation in teamwork
- ✓ VR is the most applied technology in home-based nursing education.
- ✓ 3D virtual anatomical models and 360-degree videos are appropriate options for such simulations.

Discussion

- ✓ Potential for applying AR technology in the future
- ✓ AR has its own feature of easy assessment and is not so dependent on auxiliary or other devices
- ✓ AR could provide widespread solutions at a low cost for home-based nursing education, which could benefit developing countries
- ✓ Gamified XR applications for nursing education are another future trend

Discussion

- As with all new applications of ICT, the acceptance of technology in the home nursing field also needs to be under consideration
- Our previous study showed that home-based healthcare professionals could not easily adapt to the new ICT
- VR applications using HMDs can potentially induce motion sickness
- The time period of education, the level of integration of the XR technology, and the way of interaction with the systems are all aspects that need to be further discussed

This review only focuses on the XR applications in home-based nursing education, which is quite a narrow scope.

Conclusion

- ❖ This study conducted a systematic literature review to discover the current state-of-art XR applications applied in home-based nursing education and their potential and challenges.
- ❖ Seven papers are selected and analysed.
- ❖ The results show that VR is the most used technology in this area for an immersive home-environment simulation. AR was also applied in one study, but a general trend exists to develop more applications.
- ❖ How to effectively integrate the XR technology smoothly in home-based nursing education and increase the target users' acceptance will be the challenge in the future.

Thanks and Questions?

