

# Immersive Virtual Reality in Secondary School Science Education: A Scoping Review

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**Aim:** To understand the quantity and quality of work that has investigated the use of immersive virtual reality in science education in primary and secondary school.

**Background:** There are still significant challenges in the teaching and learning of scientific concepts. In particular, it has been found that students are failing to understand basic scientific concepts, or have hard-rooted misconceptions about them that are in contrast with scientific views (Smith & Neale, 1989) (Duit & Treagust, 2003). Researchers agree that students' difficulties with learning science occur using commonplace pedagogical approaches (Hewson & Hewson, 1983), and that science is an informed knowledge-building process requiring participatory element to be effectively taught (Jackson & Fagan, 2000) (McFarlane, 2013) (Duschl, 2008). Immersive virtual reality (IVR) could be a useful tool for supporting these participatory elements.

**Methodologies:** This scoping review follows the methodological framework set out by Arksey & O'Malley (2005).

**Results:** The initial search yielded 843 results from 4 electronic databases. Of these, 5 results were found to be directly relevant to this review after refinement. It was found that studies sought to either create an IVR intervention for teaching and learning science, citing it as useful and beneficial, or they sought to investigate how IVR aided in the participatory learning process. It can be postulated that work in this area is limited, as mirrored by Dede, Salzman & Loftin (1996), and as recently as Friena & Ott (2015). The research generally shows a positive attitude towards the potential of IVR for participatory science education interventions, however the evaluation of the studies in each paper is either missing entirely or lacking sufficient evidence to support this hypothesis.

**Conclusion:** Immersive Virtual Reality interventions have potential benefits that could aid in the learning outcomes of primary and secondary school science education, however more rigorous and structured evaluation methods must be employed in order to confirm or refute this potential.



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