

Vignette on AI Based VR in Primary Science Teacher Education

Course	QCS30A and ACS50G Pedagogies in Primary Science
Modality	Asynchronous pre-class activity (20 mins) for blended learning Face-to-face teacher education workshop (2 hours) combining AI-based VR exploration, collaborative lesson co-design, and reflection.
Intended Learning Outcomes	By the end of the lesson, pre-service teachers will be able to: • Identify the inquiry affordances of AI and VR for investigating scientific phenomena that are difficult to observe in classrooms; • Co-design a primary science inquiry lesson that uses an AI-based VR resource; and • Critically discuss the pedagogical potential and limitations of AI-based VR.
Role of Faculty	Explore (either pre-class as part of blended learning or face-to-face): The instructor frames the problem of teaching phenomena that are difficult to observe and invites pre-service teachers to compare various types of scientific models, including photographs, videos, physical models, AR, and VR. The instructor then guides pre-service teachers to explore AI-based VR activities as inquirers. Co-design (face-to-face): The instructor introduces two pedagogical frameworks: (1) learning theories and (2) a before–during–after VR lesson structure. First, the learning theories help groups align technological affordances with intended science learning outcomes. Second, the lesson structure guides the sequencing and flow of their designed lessons. Reflection (face-to-face): The instructor facilitates presentations and discussion of the designed lessons, drawing attention to the contribution of AI and VR, the teacher guidance required, and circumstances in which another representation or a real field experience may be more appropriate.
Role of Students Learning as Designing: Process	Explore (either pre-class as part of blended learning or face-to-face): Pre-service teachers experience AI-based VR activities as inquirers. They interact with the four AI characters in the activities. They can question the characters, gather clues, construct tentative conceptual relationships embedded in a key phenomenon, and identify the affordances of AI and VR. Co-design (face-to-face): In groups, pre-service teachers are asked to collaboratively design AI-based VR inquiry lessons. In particular, they plan how to adapt and

<i>Learning as Participating: Practice</i>	modify the exemplary lesson they previously explored to suit their own lesson contexts. Reflection (face-to-face): Pre-service teachers review their lesson designs and discuss whether immersion, dialogue, feedback, and scenario changes advance the intended science learning. They also identify possible practical considerations, inclusion and access issues, technical constraints, and ways of checking AI-generated information.
Role of AI	Learn to Teach Science with AI • AI can act as conversational virtual characters representing various agents in scientific phenomena, responding to learners' questions. (Learning with AI) • It provides clues, follow-up prompts, and responsive information rather than presenting completed conceptual relationships. (Learning with AI) • AI-generated responses are treated as data to be evaluated against observations, curriculum resources, and scientific evidence rather than accepted as unquestioned answers. (Learning beyond AI)
Artefacts (if any)	• Group affordance map comparing AI, VR, and more familiar scientific models. • Brief co-designed primary science lesson plan using the affordances of AI-based VR resources • Pupil investigation prompts, evidence-recording sheet, and scientific representation. • Group reflection on the pedagogical potential, limitations, and responsible use of AI-based VR.