IEEE VR 2017 - K-12 embodied learning through Virtual and Augmented Reality (KELVAR) workshop. 
Sunday 19 March - Notes from the large group discussion.

1. It is key that there is co-participation from all stakeholder (developers, teachers and students) designing and evaluating AR and VR educational tools. How can we facilitate teachers and students collaborating with game developers? Can developers take lesson plans and gamify these? Are there existing collaborative space/tools we might use to build our community (i.e. slack group, zotero – a Facebook and Linked-in site already exist - https://www.facebook.com/groups/1178589018874446/)

2. How do we demonstrate to teachers the pedagogical, learning and curriculum value of immersive technologies? Only when teachers ‘demand’ the technology will the field go ahead.

3. Rigorous evaluation of the educational ‘value-add’ of immersive technologies is required. The evidence base needs to address if immersive technologies facilitate students in meeting learning standards/outcomes, including but beyond measures of motivation. We should be evaluating whether immersive technologies enhance students ability meet learning standards/outcome but also if the improve/deepen learning for those with lower achievement (learning gains).

4. Apart from a firm evidence base, how else can we ‘sell’ AR & VR to the teaching profession? Should teachers be the main champions of spreading the word and demonstrating what can be done? A major barrier is the time restraints teachers’ face in engaging with the ‘new’ given how crowded the curriculum and their work day is already.

5. How can immersive technologies be designed to tailor to individual learner difference (personalised learning)?

6. What are the ‘pedagogical bottlenecks’ that get in the way of implementing immersive technologies to enhance education? What is our conception of pedagogy when we consider immersive technologies- Is it teacher-led didactici or guided discovery or student-led learning? Can Chi & Wiley’s ICAP framework on learning be applied to this space - http://www.tandfonline.com/doi/abs/10.1080/00461520.2014.965823

7. There are serious digital divide issues (equity in education) to consider when upscaling the use of immersive technologies in classrooms and schools. Low income students and school communities cannot afford mobile devices, let alone expensive VR/AR hardware & software. There may also be a technical divide where wealthier schools can afford to upskill their teachers in the expertise required to use immersive technologies, but poorer schools cannot do this.

8. Can special spaces within schools be set up for immersive experiences ie school libraries?

9. Which countries are investing in immersive technology for education – Is China leading the way?

10. There is a need for a repository or hub on all things on immersive education so that evidence, ideas, resources and ‘lessons learnt’ can be freely shared by teachers, students, researchers and developers alike.

11. How can aggregated data or analytics be harvested so that we can understand learning within immersive environments, particularly learning over time?

12. There are rapid prototyping platforms that are available for quick proof of concept (ie Anylands). These may be useful when working with students and teachers.
13. We need to get to a place where teachers and students can easily import/create content in immersive AR/VR. There is interesting work going on in the importing of data from other sources (drones, museums) in the geography and technology field, particularly with 360 degree tech, but we aren’t quite at the easy access and use stage yet.

14. This may very well be a student-led revolution in education. Students are often ahead of teachers technically and in terms of learning and deploying new technologies. We should give problems in learning to students and see what they come up with. Equipped with the right knowledge, skills and tools students undertake learning and innovation outside of school hours. We should address the digital divide so that all students have an opportunity to drive their own learning in this way.

15. We need to have a deeper conversation on the role of AI and virtual agents in education and immersive environments. With AI and immersive technologies, the developmental stage of the child must be considered so that benefits are maximised and harms identified and negated.

16. Some identified harms include cyber sickness, ‘tunnel vision’ that results in a lack of awareness of surroundings, discomfort with wearing equipment.

17. We need to collaborate in order to harness the potential for inter/active, experiential, and embodied learning that immersive technologies can afford so that students can have agency in learning.