

Using Augmented Reality to engage audiences in the understanding of the Carbon cycle

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We designed an activity to improve understanding of the Carbon cycle, which is key for life on Earth. The activity had 2 main objectives: a) Increase understanding of the Carbon cycle, its reservoirs and fluxes and comprehend the notion of imbalance and human interference; b) Motivate a wider audience to learn about the Carbon cycle and how we are part of it. The reason for using augmented reality (AR) coupled to inquiry-based learning was to motivate students to complete the activity independently and make it more appealing to a wider audience. By layering virtual information over the real physical world (3D models with animations), AR provides an exciting array of enhanced learning and engagement educational possibilities (e.g. Wang et al., 2018). In fact, AR has been linked to increased concept understanding, long term concept retention and motivation at all levels (e.g. Wang et al., 2018). As the Carbon cycle is complex, we used a simplified one to design the activity, retaining all the key repositories and fluxes (e.g. Killips and Killips 2005). The Carbon cycle was divided into 7 stations that were placed throughout the university campus, and which can be accessed by anybody using an android smartphone. They can choose to complete the whole cycle and answer a questionnaire, or just browse freely. Those who completed the activity were requested to answer a short activity survey. An 84.8 % of the users report that activity increased their motivation, and that it contained clear information and 90.9% reported that their knowledge of the Carbon cycle had significantly improved. We hope that giving users the opportunity to live the Carbon cycle, and see the magnitude of the impact human activity has on it, will foster interest in what we can do to reduce or mitigate the impact we are having on our planet.

Killips, S., & Killips, V. (2005). *Introduction to Organic Geochemistry*, 2nd edn (paperback).

Wang, M., Callaghan, V., Bernhardt, J., White, K., & Peña-Rios, A. (2018). Augmented reality in education and training: pedagogical approaches and illustrative case studies. *Journal of ambient intelligence and humanized computing*, 9(5), 1391-1402