1-2C Extraneous cognitive loading of 3D animations and the use of Google cardboard (VR) in undergraduate teaching

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Digital and online learning, and development of multimedia technologies, have contributed to a large-scale shift in learning methods and student expectations in higher education. We have re-examined existing theories to guide the design of multimedia presentations and maximize learning potential. These include; 'Split Attention Effect', 'Spatial & Temporal Contiguity Principles', 'The Coherence Principle' and the 'Redundancy Principle'. These theories were originally developed to guide the design and delivery of multimedia which was mainly 2D but comprised words and pictures. However, these theories may need revised when considering modern 3D animations, virtual reality (VR) and augmented realities (AR). Our own research on the extraneous cognitive loading of 3D animations revealed that 78% of students (of 41 tested) prefer a presentation design which is contrary to the 'Redundancy Principle'. The students selected a presentation that had both a spoken narration and on-screen text.

We have recently trialed the use of Google cardboard in undergraduate teaching to deliver VR viewing of 3D molecular structure using smart phones and cheap viewers. This approach was extremely well received and provides the impetus to develop further VR-based teaching content. Interestingly, the extraneous cognitive load (background & setting) that provides the immersive experience (and so becomes essential not extraneous) may reduce learning or the level of complexity (intrinsic cognitive load) that can be delivered.

Therefore, our presentation will provide a report on our previous work on cognitive loading of animations and will consider the issues that lie ahead for the instructional design of VR and AR content.

References

Daly, C.J., Bulloch, J.M., Ma, M. & Aidulis, D.A. (2016) A comparison of animated versus static images in an instructional multimedia presentation. *Advances in Physiology Education*. 40: 201-205