**HUBS and HUCBMS Learning and Teaching Workshop Report: Overcoming Barriers in Chemistry Teaching within the Biosciences**

The HUBS and HUCBMS workshop on ‘Overcoming Barriers in Chemistry Teaching within the Biosciences’ was hosted by Clare-Louise (Towse) Peyton at the University of Bradford on the 1st July 2019. This workshop was aimed at teachers and instructors in HE that were faced with challenges in teaching chemistry on bioscience and biomedical science programmes. The workshops goal was to identify key challenges and examine ways in which we could modify our practice to enable more effective teaching of chemistry.

The workshop welcomed staff from across the UK (Roehampton, Lancaster, De Montfort, Reading, Wolverhampton, York, Edinburgh, East Anglia, London Metropolitan, Coventry and UEA) as well as staff from both the chemistry and biomedical science teams at the University of Bradford. The wide diversity of attendees, in terms of their expertise and their teaching, allowed for very engaging discussions where chemists and biologist were able to discuss their different approaches to teaching chemistry topics. The workshop began with talks by Prof Anne Graham (University of Bradford) and Dr Nicholas Chatterton (Open University) where they gave an overview of their experiences, challenges faced when teaching chemistry components on bioscience programmes and approaches taken to teach chemistry on bioscience and biomedical programmes. These were followed by a talk by Mr John Fairhall (University of Bradford) and Dr Clare Peyton that looked at barrier-crossing with technology through adopting advanced technologies, such as augmented reality (AR) and virtual reality (VR), to visually link chemistry fundamentals to biomolecule structure and function. The math problem was also examined by Mrs Pam Dunn (Harrogate and District NHS Foundation Trust) as a key component that often presents a barrier when teaching chemistry is the mathematics involved. The morning also included a group discussion session led by Dr Gi Helfer (University of Bradford) that allowed us to share the barriers that were common across our range of experiences, as well as individual experiences and solutions.

In the afternoon three sessions ran in parallel linked to the topics covered in the morning session. Two of the sessions shared technological approaches used or being trialled at Bradford, *i.e.* augmented, virtual and mixed realities, to improve cross-disciplinary teaching of chemistry and biology. In these sessions, attendees were shown how using AR and VR can convey chemistry in a more accessible way and were given an opportunity to create their own material that could be embedded in visual learning environments. The third afternoon session ‘Pedagogy Alchemy’ was led by a synthetic organic chemist who facilitated discussions around the differences between how chemists and biologists teach chemical problems. This different top-down or bottom-up ways of looking at the world by chemists and biologist has led to different approaches to teaching the underlying chemistry associated with biomolecules. An approach taken by lecturers in chemistry to tackle barriers with students being able recognise and understand the chemistry of specific functional groups in order to predict the reactivity of molecules unfamiliar to them is to teach the language of organic chemistry. In this session this approach taken by a chemistry academic was examined and discussed whether taking a chemists perspective may aid in teaching chemistry within a bioscience programme.

The response to the workshop was positive and attendees expressed how interesting it was to experience the use of augmented and virtual reality models to overcome some of the barriers in student understanding of chemistry in large biomolecules. Attendees received a booklet that contained a tutorial to use in generating augmented reality models of their own. An email list has been retained of all attendees that will be used to arrange future events and Clare Peyton is now setting up a website where educational materials can be shared with the network of academics who attended the workshop and other educators.