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Animations for Teaching Food Chemistry: A Design Approach for Linking Chemistry Theory to Everyday Food

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Abstract : In STEM education, students often have difficulty linking static images and words from textbooks or online resources, to the underlying mechanisms of the topic of study. This can often dissuade some students from pursuing study in the physical and chemical sciences. A growing movement in current day students demonstrates that the YouTube generation feel they learn best from video or dynamic, interactive learning tools, and will seek these out as alternatives to their textbooks and the classroom learning environment. Chemistry, and in particular visualization of molecular structures in everyday materials, can prove difficult to comprehend without significant interaction with the teacher of the content and concepts, beyond the timeframe of a typical class. This can cause a learning hurdle for distance education students, and so it is necessary to provide strong electronic tools and resources to aid their learning. As one of the electronic resources, an animation design approach to link everyday materials to their underlying chemistry would be beneficial for student learning, with the focus here being on food. These animations were designed and storyboarded with a scaling approach and commence with a focus on the food material itself and its component parts. This is followed by animated transitions to its underlying microstructure and identifying features, and finally showing the molecules responsible for these microstructural features. The animation ends with a reverse transition back through the molecular structure, microstructure, all the way back to the original food material, and also animates some reactions that may occur during food processing to demonstrate the purpose of the underlying chemistry and how it affects the food we eat. Using this cyclical approach of linking students' existing knowledge of food to help guide them to understanding more complex knowledge, and then reinforcing their learning by linking back to their prior knowledge again, enhances student understanding. Food is also an ideal material system for students to interact with, in a hands-on manner to further reinforce their learning. These animations were launched this year in a 2nd year University Food Chemistry course with improved learning outcomes for the cohort.

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