General chemistry students' cognitive engagement and what they attend to during a three-dimensional modeling activity focused on chemical and physical properties of coordination complexes

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In chemistry, three-dimensional models are being used to help students comprehend advanced topics within the subject. Because a greater cognitive load is often related to three-dimensional models, learning what raises the cognitive load and determining the best way to measure it is critical. From there, steps can be taken to help lower the cognitive load and make the material easier for students to comprehend. To understand cognitive load concerning models, students were presented with physical three-dimensional models of various coordination complexes and asked to determine bond angles, the metal present in the complex, polarity, and to draw possible isomers and the most favorable interactions that would occur if a counter ion was present. Students simultaneously completed a worksheet related to the physical tasks. Tobii Glasses 2 were used to track eye fixations and visits while students completed the exercise, and an electroencephalogram (EEG) cap was used to determine what parts of the brain were most active to measure cognitive load. Results discussed will include the relationship between average engagement index and fixation duration/visit count and how it relates to cognitive load, as well as a comparison of how fixation duration/visit count varied between two years of students when the activity instructions were changed from year to year.