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Organic Chemistry through Dance

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Introduction

This research project explores representing organic chemistry mechanisms using dance. Dancers represent molecules, electrons, and atoms in demonstrating the movement of electrons and bonds created and broken by the movement. It was concluded that some organic mechanisms and ideas can be easily transferred to a dance concept, while others take more time and exploration. Additionally, dancers representing the atoms and electrons were able to have a better grasp of what was occurring, regardless of chemical education background. This leads to the conclusion of a new way to implement kinesthetic learning into the chemistry classroom. The purpose of the videos are to help anyone regardless of chemical background understand the reaction.

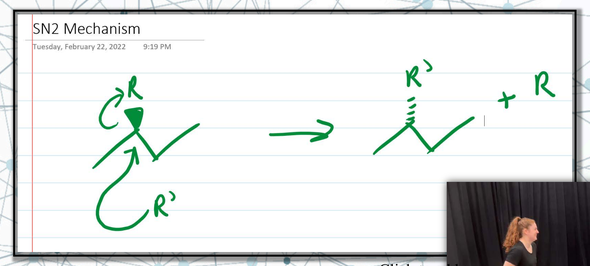
Background

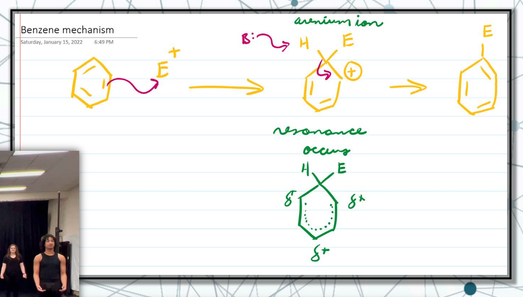
"DanceChemistry" videos on Youtube and their effectiveness as "supplementary" material in the classroom was used as a template and starting point (Edwards and Tay 1956). Students were reportedly able to "gain confidence" in their understanding from the videos (Edwards and Tay 1958). John Bohannon says that the best way to explain concepts is with the fewest words and, if possible, "no words at all" (Bohannon). Additionally, there are certain concepts that transfer better to the dance format and must be taken into consideration while choosing what organic mechanisms will be used (Lerman "Using the Arts" 1238).

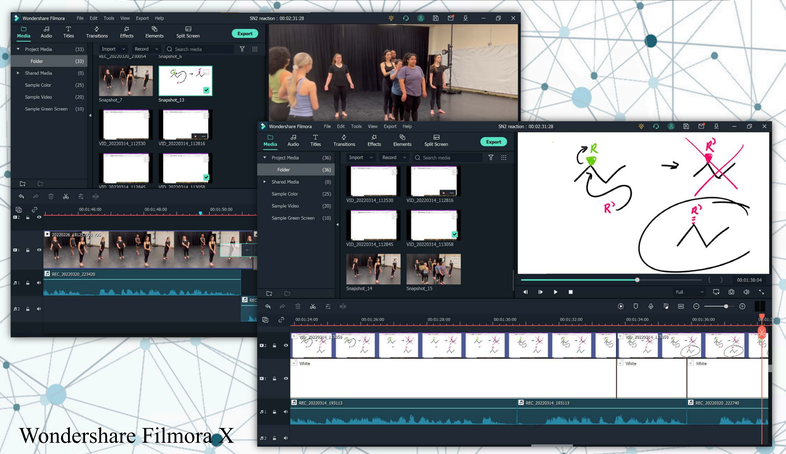
A substitution nucleophilic reaction, SN2, and electrophilic aromatic substitution reaction, SNAr, were selected to be represented in this study. An SN2 reaction is a common reaction introduced in Organic I, while an SNAr reaction is more involved, being introduced in Organic II. Both reactions will be introduced at a basic level in the films. The dancers will be introduced to the topics and the concepts will be explained while filming.

Method

13 dancers were selected to represent the atoms and electrons. The number of dancers was determined by the number of electrons, atoms connected, and bonds needed to be created, while not overcrowding the space. The dancers were taught basic choreography to demonstrate the reaction. The choreography was filmed at various angles and edited in Wondershare Filmora X. A voiceover, as well as a drawn mechanism was recorded to explain the theory and occurrences to a watching audience. The use of video, as a visual aid, alongside the verbal explanation are to be used in the process of understanding how the mechanism and reaction is taking place







Wondershare Filmora X editing software

From top to bottom, SN2 written mechanism with scenes from dance representation, SNAr written mechanism with scenes from dance representation

Results

It was determined that the participating dancers, with little to no college-level chemistry, that represented the reaction gained a better understanding of what was occurring. Many of the participants claimed to "actually understand science," while having fun.

Individuals watching the videos claimed to have a basic idea of the reaction. The videos can reinforce understanding and lecture but should not be used as the only source of education. They can be implemented to introduce mechanisms and concepts in a fun and unique way.

Future Studies

This research can be further explored in the chemistry classroom by reproducing the movement in the videos. The patterns of dancers can be modified to simpler movement to be executed by individuals with little to no dance experience. It is predicted the students with prior chemistry knowledge will benefit from the kinesthetic learning.

Dance can be a useful tool in the science classroom. Other interesting subjects to explore dance representation would be other organic mechanisms, inorganic symmetry, physical chemistry orbitals, and many others. It must be taken with care not to approach too complicated concepts, or the videos may get too confusing.

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