Project Deliverable B - GNG 1103

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# January 26, 2020

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# Introduction

Virtual reality (VR) has the ability to help users visualize and interact with a variety of abstract subject matter. This product will utilize the power of VR to allow students to interact with molecules at a microscopic level and develop an understanding of difficult concepts. The target group is students who have a background in general chemistry, and are proceeding to introductory organic chemistry. This product uses technology to connect the effects of macroscopic and microscopic reactions. Its needs and problem statement are outlined below.

# Needs

|  |  |  |  |
| --- | --- | --- | --- |
| # | Need | | Imp. |
| 1 | The product connects molecular and macroscopic. | | 5 |
| 2 | The product is interactive. | | 5 |
| 3 | The product is scientifically accurate. | | 5 |
| 4 | The product follows chemistry colour schemes. | | 3 |
| 5 | The product shows feedback on what the user has learned. | | 4 |
| 6 | The product represents molecules as dynamic. | | 5 |
| 7 | The product evaluates the user’s understanding. | | 5 |
| 8 | The product is simple to use. | | 4 |
| 9 | The product can move between 2D and 3D representations. | | 2 |
| 10 | The product conveys the probability in collisions. | | 3 |
| 11 | The product emphasizes the relationship between size and time. | | 2 |
| 12 | The product contains elements of gamification. | | 3 |

# Problem Statement

A need exists for a VR product which helps students understand the relationship between the microscopic and macroscopic world of chemistry. The product will be easy to use, interactive, scientifically accurate, and will evaluate the users understanding of the concepts learned.

# Benchmarking Designs

There exists multiple visual learning devices that have been used for understanding scientific concepts. Odyssey, PhET Interactive Simulations, and MEL Chemistry VR Lessons are some that can be used for chemistry and contain some aspects that are alike to the project. Odyssey is a high quality expensive product that shows multiple scenarios in chemistry to help students learn. It is scientifically accurate, contains many lab experiments and some aspects of interactivity. It has molecules that move, showing the dynamic quality that molecules have, which is extremely important to the client. Although, this is not virtual reality and therefore doesn’t immerse the student. Odyssey also charges a quite expensive licensing fee, which makes it unattractive to the average student. MEL Chemistry VR lessons is a VR learning tool designed for children to grasp difficult chemical concepts such as molecules and their interactions with the world. Each lesson starts by zooming in to the molecules and thus connects the real world with the world of molecules. The material is taught through shorter 3-7 minute lessons. The concepts of MEL Chemistry VR lessons are similar to the objective for our project. Like MEL, this project revolves around the ability to use simulations and interactivity to promote a better understanding of complex microscopic ideas. The use of VR is effective in conveying attributes such as the dynamic nature of molecules, otherwise difficult to convey in 2D. Similarly, our design product is required to connect the macroscopic world of chemistry to the microscopic one. A short lesson such as this will also promote focus within university students and reduce students resorting to distractions during class. Although this product is very similar to what we plan to produce, it is inaccessible and expensive, making it impractical for the general public. Another product is PhET which offers free simulations of applicable and fundamental scientific subjects, unlike the other products which are harder to access. Phet is generally used as a supplement to conventional learning methods, when the student is in search of a more visual experience. It is user friendly and simple to use. All software above have several aspects to include in our design.

# Conclusion

In conclusion, the goal of this product is to introduce students to a VR based learning environment, which will help with the understanding of difficult organic chemistry related concepts. There is a need for a product that helps students understand macroscopic and microscopic properties. This product will give the user fundamental knowledge to be used throughout the rest of their studies.