DOI: 10.20396/revpibic.

XXVII Congresso de Iniciação Científica Unicamp
16 a 18 de outubro de 2019 - Campinas | Brasil

Development of Interactive Educational Content for Teaching Chemistry Using Augmented Reality Resources.

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Abstract
The development of 3-D applications with the use of augmented reality is proving increasingly efficient for the development of education. In this way, the objective is to develop an application for the study of molecular geometry that allows the union of the modeling process with augmented reality.

Key words:
Modeling, augmented reality, molecular geometry.

Introduction

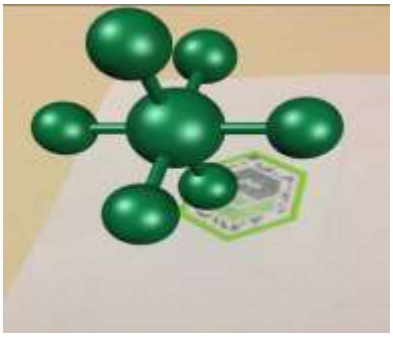
The teaching-learning process in chemistry on many occasions can be an obstacle for both student and teacher. The process of studying molecular geometry becomes complex when trying to perform the representation of molecules in the 2-D plane. Thus, making it difficult for the student to be able to recognize the dimensions and differences between molecules. The difficulty found in the classroom is related to the students' level of abstraction of content. Therefore, with the explosion in the popularity of smartphones and the development of augmented reality (AR) applications, the teacher has been given an unexplored way of teaching spatial reasoning skills to chemistry students. Transforming the technology present in smartphones into a learning tool. AR technology enables impressive and immersive experiences, offering untapped opportunities for research and education. In this way, the objective is to develop an interactive application that facilitates the teaching-learning process in the study of molecular geometry, allowing the understanding of this content through modeling with the use of augmented reality in smartphones. In which the use of AR to understand this topic will represent a significant increase in the level of understanding on the part of the students.

Results and Discussion

For the modeling of molecules selected for study of molecular geometry, BCl_3, CH_4, H_2O, NH_3 and SF_6, a research was made of the angles, bond length and relative sizes of the atoms in the literature. Through *Blender software 2.79* molecules were modeled having the application of interactive animation. After performing the modeling of the molecules in *Blender 2.79* the *Blend4web* platform (figure 1) allowed to transform the modeling done in *Blender 2.79* to html files. The augmented reality application was performed using *Vuforia software* (figure 2) only the octahedral SF_6 molecule. The other molecules are in development. Both of the software used are free platforms.

Figure 1: Representation of the octahedral geometry of the SF_6 molecule modeled in *Blender software 2.79* and represented in html through *Blend4web software*.

Figure 2: Representation of the octahedral geometry of the SF_6 molecule with Augmented Reality presentation using the *software Vuforia* applied in smartphones.



Conclusions

With the construction of the prototype of this project, it is believed that the use of smartphone resources will achieve greater involvement by students and a positive influence on the development of molecular geometry content. Allowing an increase in cognitive and memory working capacity in students and facilitating the process of teaching learning.

Acknowledgement

Federal Institute of Education, Science and Technology of São Paulo - Campus Campinas
Information Technology Center "Renato Archer"

SQUIRES, D. *Journal of Educational Technology*, v. 14, n. 1, **2017**.
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