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CONSTRUCTIVE LEARNING OF PERIODIC ELEMENTS USING VIRTUAL REALITY

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ABSTRACT
A new learning method using Virtual Reality [VR] is proposed with the help of UNITY software, to provide a better understanding for the problem in educational sector with the chosen part of the periodic table to control, combine and interact, helping the students to improve and experience in a meaningful way, academically. Virtual Reality [VR] provides an opportunity for constructional learning (i.e.) allowing students construct their own knowledge from meaningful experience. Low-performing students can also improve academically more than those learning in a traditional way.

KEYWORDS:
Virtual Reality, Unity Software, Periodic Table.

INTRODUCTION

Virtual Reality (VR) literally makes it possible to experience anything, anywhere, anytime. It is the most immersive type of reality technology and can convince the human brain that it is somewhere it is really not. Head mounted displays are used with headphones and hand controllers to provide a fully immersive experience. With the largest technology companies on planet earth (Facebook, Google, and Microsoft) currently investing billions of dollars into virtual reality companies and startups, the future of virtual reality is set to be a pillar of our everyday lives. The predominantly virtual spaces where real world objects or people are dynamically integrated into virtual worlds to produce new environments and visualizations where physical and digital objects co-exist and interact in real time is known as Virtual Reality.

An artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment. Virtual reality (VR) refers to computer-generated environments or realities that are designed to simulate a person's physical presence in a specific environment that is designed to feel real. The purpose of VR is to allow a person to experience and manipulate the environment as if it were the real world. The best virtual realities are able to immerse the user completely.

Virtual reality should not be confused with simple 3-D environments like those found in computer games, where you get to experience and the environment through an avatar, rather than personally becoming part of the virtual world. VR aims to make you feel completely immersed in another world and blocks everything else out. It is a total virtual environment with none of the reality visible. The user is placed is in a completely different space from the actual location. The space is either computer generated or captured and video-recorded, entirely occluding the user's actual surroundings. VR technologies usually use compact, opaque head-mounted-gears.

A realistic three-dimensional image or artificial environment that is created with a mixture of interactive hardware and software, and presented to the user in such a way that the any doubts are suspended and it is accepted as a real environment in which it is interacted with in a seemingly real or physical way. Virtual reality (also called Virtual Realities or VR) is best understood by first defining what it aims to achieve – total immersion.

Total immersion means that the sensory experience feels so real, that we forget it is a virtual-artificial environment and begin to interact with it as we would naturally in the real world. In a virtual reality environment, a completely synthetic world may or may not mimic the properties of a real-world environment.

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This means that the virtual reality environment may simulate an everyday setting or may exceed the bounds of physical reality by creating a world in which the physical laws governing gravity, time and material properties which no longer hold.

Virtual means 'Near or Implied' & Reality means the state of things as they actually exist, thus virtual reality is nothing but 'Near Reality'. Virtual Reality is a simulation of a physical entity into a virtual or imaginary environment that is created using software's or programs that defy beliefs of a user compelling him/her to accept it as actual reality. Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment. On a computer, virtual reality is primarily experienced through two of the five senses: sight and sound.

LITERATURE SURVEY

[1] The authors have used the Augmented Reality tool technique to support chemical reactions. Augmented Chemical Reactions is an application that shows the 3D spatial structure of molecules as well as the dynamics of the atoms in and between molecules. The main drawback of the work is the Privacy control will become a bigger issue and the advantage is the search effort is reduced and the interaction is multi-modal. [2] The authors have used the technique Augmented Reality and projection type smart devices is proposed. The proposed system is expected for deep understanding of the formation of the chemical reaction formulas, and the number of atoms and molecules. The advantage of the work is only little interaction is required. The drawback is breach of security. [8] The authors have used the Virtual Reality technology to support chemistry learning and practicing. The work also describes the importance of developing learning tools, such as virtual laboratories in different areas of science with emphasis in chemistry, through the development of a virtual laboratory that allows students to access to an environment of experiential learning. The advantage of the work is it allows an access to an environment of experimental learning. The drawback of the work is that the completion of the laboratory is a long process. [9] The authors have used the virtual Reality technology for interactive and informative learning. A Virtual Reality application was developed for educational purposes such as practical learning and performing live experiments in the field of engineering and science. The advantage of the work is the performance is better with the help of Virtual Reality Technology. The drawback of the work is Applying the technology into virtual reality takes time. [10] The authors have used the Virtual Reality Technology for the Chemical Laboratory Experience System. The advantage of the work is, it gives better learning experience of the chemical laboratory. The drawback of the work is, Adaptability from board learning to virtual reality learning is not easy.

METHODOLOGY

The methodology adopted for the constructive learning of periodic elements is done using Virtual Reality. The software required for the work is UNITY Software, where the entire building of the periodic element is done. Finally after the completion of the software work the project is converted to the Virtual Reality platform. The Hardware required for the project is VR headset.

Table 1: Unity Software Details

Developer(s)	Unity Technologies
Initial release	1.0 / June 8, 2005; 13 years ago
Stable release	2018.2.11 / October 4, 2018
Written in	C++ (Runtime) C# (Unity Scripting API)
Operating system	Windows, macOS, Linux(experimental)
Platform	IA-32, x86-64, ARM

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RESULTS AND DISCUSSION

Result for H_2O

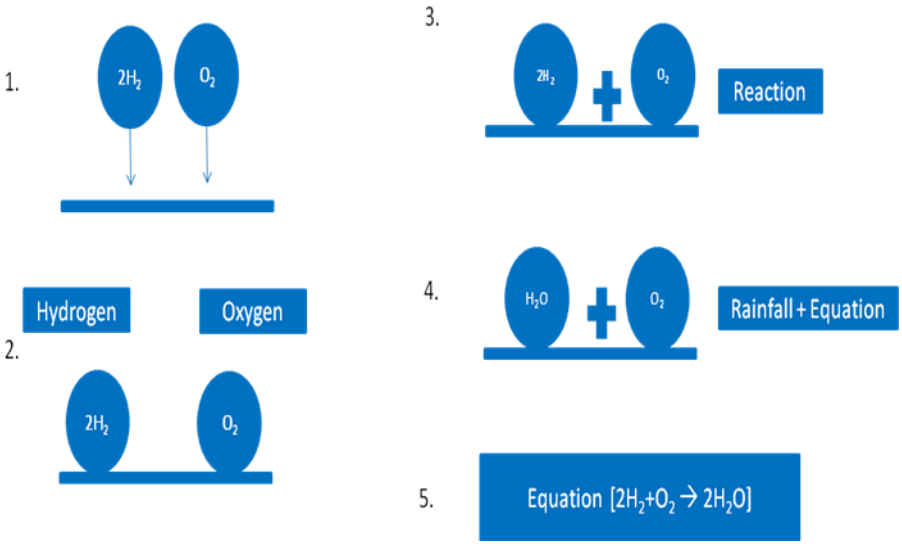

Fig. 1: Formation of Water

Discussion

The Hydrogen and Oxygen elements are placed on the surface. A brief description about Hydrogen and Oxygen element is displayed by clicking on the button. Combining of Hydrogen and Oxygen elements for reaction is carried out. The result of combining Hydrogen and Oxygen elements with equation is shown. The final equation of the elements after being combined with result is displayed as $2H_2O$.

Result for CO_2

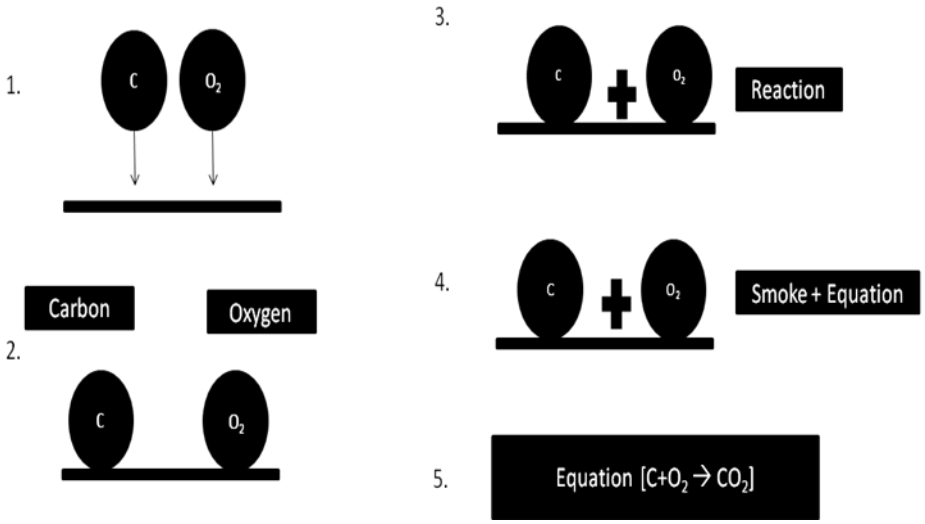

Fig. 2: Formation of Carbondioxide

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Discussion

The Carbon and Oxygen elements are placed on the surface. A brief description about Carbon and Oxygen element is displayed by clicking on the button. Combining of Carbon and Oxygen elements for reaction is carried out. The result of combining Carbon and Oxygen elements with equation is shown. The final equation of the elements after being combined with result is displayed as CO_2.

CONCLUSION

Survey of the Periodic elements such as Hydrogen, Oxygen and Carbon is carried out along with their properties. Formation of Water [H_2O] and Carbon dioxide [CO_2] using the above elements with the help of Virtual Reality[VR] in the Unity Software is done after the survey. This project is helpful especially for the rural background school students, to have a theoretical and practical understanding. It can also be carried out for all the other elements in the periodic table.

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Mrs.R.Mohanapriya completed her Bachelor of Engineering in the year 2008 and her master's degree in the year 2010 conferred with gold medals in both UG and PG. Further she completed her master's in Business administration and currently doing her Ph.D through Anna University, Chennai. Her contributions continue as she has participated in several national and international conferences and also has published several papers through reputed journal forum.

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