# ENHANCING E-LEARNING WITH VRML TECHNIQUES

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*Abstract* - **Virtual Reality (VR) is a computer-generated three-dimensional space that is multi-sensorial, interactive and engaging. 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. This research paper is focused on enhancing E-Learning using the three dimensional Web Techniques namely the Virtual Reality Techniques. The present state of Techniques in Virtual Reality is static in nature**.

*Index terms -Virtual reality, multi-sensorial, modelling, dynamism, Blood pressure*

## I. INTRODUCTION

In this paper 'Dynamism' is imparted in the Virtual reality Learning Objects. The parameters are picked up dynamically from the Data base (which gets updated dynamically according to the real time situation).

The following three domains are taken up for implementing these techniques

1) Educational Field
2) Industrial applications
3) Medical Field

1) In the field of education, the characteristics of basic Learning Objects (for example basic geometrical shapes and colours) can be altered dynamically by the learner and the same is displayed in a 3 dimensional web.

2) In the field of Industrial applications, the basic manufacturing methodologies are created using a Virtual reality modelling. However the characteristics (for example the dimensions of the job, the speed of Welding the intensity of the welding arc etc.) are altered dynamically, depending on the specific job

3) Medicine is beginning to see the potential of VR technology to revolutionize the practice of medicine. One such application is Blood Pressure (BP) training tool. "Blood pressure" is the force of blood pushing against the walls of the arteries as the heart pumps blood. If this pressure rises and stays high over time, it can damage the body in many ways. Simulation of the BP training tool is made (using Virtual Reality techniques) and provision is made for altering the various parameters for studying.

## II. SCOPE OF THE WORK

Virtual reality can work for educators as a tool in assisting students to become immersed in a learning environment where they can participate in their own learning in a technology based environment. Virtual Reality allows us to experience a body of knowledge interactively. Students learn while they are situated in the context where what they learn is to be applied. They get immediate feedback as they explore their understanding of the material.

Virtual Reality (VR) is becoming the enabling technology for Industrial developments. Designers can make alterations without having to scrap the entire model, as they often would with physical ones. The development process becomes more efficient and less expensive as a result.

In medicine, Virtual Reality based Blood Pressure tool is used for analysing the blood pressure. Blood is carried from the heart to all parts of your body in vessels called arteries. Blood pressure is the force of the blood pushing against the walls of the arteries. Each time the heart beats (about 60-70 times a minute at rest), it pumps out blood into the arteries. Various factors, such as age and gender influence average values, influence a person's average BP and variations. Also, an individual's BP varies with exercise, emotional reactions, sleep, digestion and time of day.

## III. OBJECTIVES AND HYPOTHESES

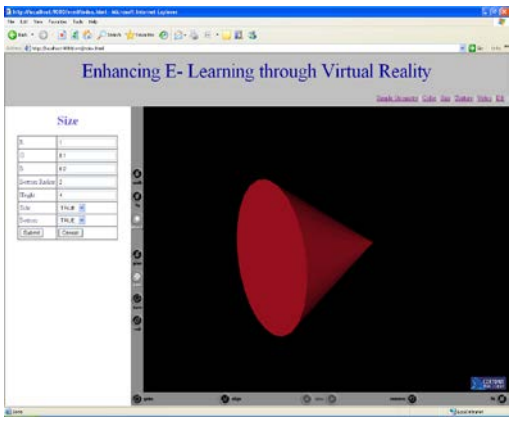
### Educational Field

As human mind can comprehend 3 D more effectively than 2 Dimension, Web based Learning using 3 D is more effective than 2 D. The concept of both 2 D and 3 D Web is used by dividing the Web page into two frames one consisting of conventional 2D and the other one 3D. User gives his required input through the 2D Screen and the output is rendered in 3D, on the other window.

Study of relative sizes: The parameters for the size is given on the 2D and according to the size, 3D objects are formed. Different operations are chosen from the data base. For each of the records of the choice, different values are picked up from the data base and the VR is produced on the fly.

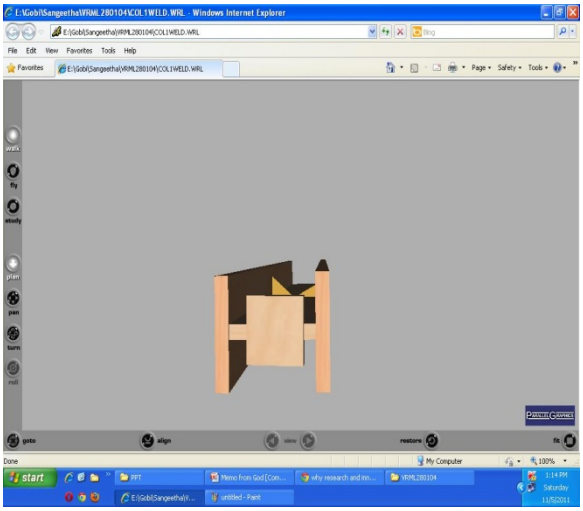
The conventional type of E-Learning limits to a single machine , but the Web based E-Learning extends to cover multiple users and the Web Based VR enhances Web Based Learning and Training.

Example1- Studying Geometric Shapes - Colours, Shapes




### Industrial applications

In the Industrial front, if the beam welding is to be explained, the VR application is the best choice as this method gives the users an opportunity to get involved as if they are involved in the real life. They can view the welding process from different perspectives as they would like to and learn the technique better.



### Medical Field

VR based Blood Pressure tool illustrates the Blood Pressure findings. Blood pressure is measured as systolic (sis-TOL-ik) and diastolic (di-a-STOL-ik) pressures. "Systolic" refers to blood pressure when the heart beats while pumping blood. "Diastolic" refers to blood pressure when the heart is at rest between beats.

Often the blood pressure numbers written with the systolic number above or before the diastolic number, such as 120/80 mmHg. (The mmHg is millimeters of mercury—the units used to measure blood pressure.)

The table below shows normal blood pressure numbers for adults. It also shows which numbers put you at greater risk for health problems.

**Categories for Blood Pressure Levels in Adults (measured in millimeters of mercury, or mmHg)**

| Classification of blood pressure for adults | | |
|---|---|---|
| **Category** | **systolic, mmHg** | **diastolic, mmHg** |
| Hypotension | < 90 | < 60 |
| **Desirable** | **90–119** | **60–79** |
| Prehypertension | 120–139 | or 80–89 |
| Stage1 Hypertension | 140–159 | or 90–99 |
| Stage2 Hypertension | 160–179 | or 100–109 |
| Hypertensive Crisis | ≥ 180 | or ≥ 120 |

The ranges in the table apply to most adults (aged 18 and older) who don't have short-term serious illnesses.

## IV. METHODOLOGY ADOPTED

These scenes are usually created with VRML. VRML 2.0 has many features like additional light effect, sound effect, fog effect, sensors to have interactions with outside world, VRML script to create additional events or objects or properties etc to make the interactions between the VR world and the user more effective.

VR applications play an important role by increasing the understanding of concepts and the techniques. This is possible because of the involvement of the user with the 3-D world and because of body centred interactions. Users can feel the situation as they are immersed within the virtual world. Percentage of immersion depends on many parameters like the created scene, network speed, computer's ability to render the scene smoothly etc.

But the scenes created by VRML lacks dynamism i.e, the scene presented will always be static. Users will get same scene again and again and it is up to the users explore the contents differently as they are free to navigate in different directions. This will give them a sense of dynamism but actually dynamism is not part of the VR applications, created with VRML.

## V. RESULTS AND DISCUSSION

As VR applications enable the user to have interaction with the virtual world, their involvement is higher and as a result their understanding also is higher. Because of this reason, VR applications are used very much in different domains.

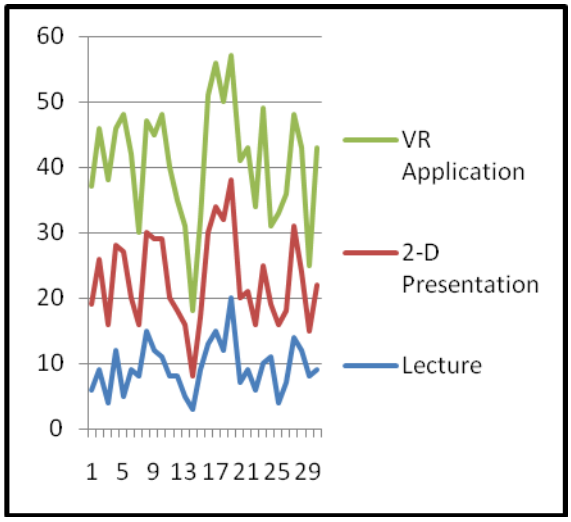
In this report, only three domains viz education, industry and medical, are considered and a study of improving the effectiveness of the scenes.

If any concept is to be explained, it is possible to do it with explanation, demo with 2-D and with 3-D scenes. Among the three the third one is always better because of its impact on the user and the understanding of the users. This is proved with the study conducted on three groups with same intelligence level. These groups were administered with questionnaire and the third group comes up to the top among the three levels.

The following tabular column illustrates the three groups of same intelligence level undergoing training by various methods.

| Roll No | Lecture | 2-D Presentation | VR Application |
|---|---|---|---|
| 101 | 6 | 13 | 18 |
| 102 | 9 | 17 | 20 |
| 103 | 4 | 12 | 22 |
| 104 | 12 | 16 | 18 |
| 105 | 5 | 22 | 21 |
| 106 | 9 | 11 | 22 |
| 107 | 8 | 8 | 14 |
| 108 | 15 | 15 | 17 |
| 109 | 12 | 17 | 16 |
| 110 | 11 | 18 | 19 |
| 111 | 8 | 12 | 20 |
| 112 | 8 | 10 | 17 |
| 113 | 5 | 11 | 15 |
| 114 | 3 | 5 | 10 |
| 115 | 9 | 8 | 15 |
| 116 | 13 | 17 | 21 |
| 117 | 15 | 19 | 22 |
| 118 | 12 | 20 | 18 |
| 119 | 20 | 18 | 19 |
| 120 | 7 | 13 | 21 |
| 121 | 9 | 12 | 22 |
| 122 | 6 | 10 | 18 |
| 123 | 10 | 15 | 24 |
| 124 | 11 | 8 | 12 |
| 125 | 4 | 12 | 17 |
| 126 | 7 | 11 | 18 |
| 127 | 14 | 17 | 17 |
| 128 | 12 | 12 | 19 |
| 129 | 8 | 7 | 10 |
| 130 | 9 | 13 | 21 |

Graphical Representation




In the Industrial front, if beam welding is to be explained, the VR application is better as this method gives the users an opportunity to get involved as if they are involved in the real life. They can view the welding process from different perspectives as they would like to and learn the technique better.

Same thing applies to medical field also. For example, doctors can perform the operation on a virtual body and they can monitor the blood pressure level, heart beats, general improvement or the deterioration of the body etc.

They can do the operation any number of times till they are equipped to perform the operation on the real body. Thus a VR model is developed to train the health care providers to find the abnormalities in the Blood Pressure.

Issues connected with VR applications are:

- Multi-user environment
- Multi-server environment
- Shared behaviours
- Persistence

To overcome these drawbacks, a new method of dynamic generation of virtual scenes for use in Internet virtual reality applications is presented. The virtual scenes are dynamically generated from virtual scene models coded in a high-level XML-based language called X-VRML. X-VRML combines the features of VRML and XML. VRML takes care of the 3-D presentation whereas the XML takes care of the data meant for it.

The X-VRML language consists of a set of XML tags introducing new elements to programming of virtual reality. These new elements enables the VR application creation with object-orientation, access to databases, and programming techniques known from procedural languages like variables, conditions, and loops. The X-VRML language overcomes the main limitations of current virtual reality systems.

Use of X-VRML simplifies the code of virtual scene models, allows retrieval of data from databases, selection of virtual scene contents, customization of virtual scenes, and efficient coding of elements that have repetitive structure. Applications of X-VRML include on-line data visualization, geographical information systems, scientific visualization, virtual games, and e-commerce applications such as virtual shops.

In the current scenario, XML plays many roles viz creation of new languages like CML, MML etc, data exchanges among the application components, dynamic data exchanges between server and the client (AJAX). These features are merged with VRML to make 3-D scene creation easy and effective as many of the application servers are capable of interpreting and processing of data in XML format, by using XML parsers.

## VI. CONCLUSION

On the whole, VR systems are much safer and, in the long run, less expensive than alternative training methods. This VR based Blood Pressure training tool helps the trainer to study about various alterations in the blood pressure. The biggest challenge in using VR technology to perform procedures is latency, since any delay in such a delicate procedure can feel unnatural to the user. Such systems also need to provide finely-tuned sensory feedback to the user. Thus our tool is to developed considering all constraints such that it provides a convenient training methods.

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