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Executive Summary

With the advent of technology, the education sector has revolutionized. From print media to the web, we have seen information getting richer and easily accessible. Thus, it has always made sense to bring web-based learning systems that is inundated with information.

Virtual Reality, a computer technology that uses software-generated realistic images, sounds and other sensations to replicate a real environment, is another such technology, which has contributed to big change in the education system.

This paper explains the importance of Virtual Reality in eLearning and how it can be incorporated into existing mobile learning applications to redefine the learning experience.

Virtual Reality for eLearning

E-Learning (eLearning) has become a popular method of sharing materials in various formats including videos and webinars. The benefit of providing continuous learning anywhere, and being cost effective at the same time, has made the adoption of eLearning grow at a staggering rate of over 40% in some countries.

In a research by Ambient Insight, Laos tops the list of such countries with the adoption growth rate as high as 49%. Considering the five-year compounded annual growth rate of 0.4%, the revenues for the eLearning industry are expected to reach $47.9 billion by 2020 from $46.9 in 2015.
The question, that now arises, is what can be done to improve the learning experience, further, to get a better understanding of topics and make them more interesting to learn? This is where the potential for Virtual Reality exists.

In a nutshell, Virtual Reality (VR) is a three-dimensional, computer-generated environment that can be explored and interacted with. This is achieved by wearing a headgear that provides visual and auditory immersion. The level of immersion that VR provides is the reason that makes it promising for the future of eLearning. Learners become fully engaged, with the learning material, which makes the learning experience more interactive and entertaining. This helps them imbibe information at ease.
Use Cases and Benefits of Virtual Reality in eLearning

The first mobile virtual reality came in the form of head-mounted devices known for their specific use. However, they were not within the reach of the common man, until recently, with the availability of more affordable mobile Virtual Reality headsets like Samsung Gear VR, Oculus Rift, HTC Vive etc., which can be integrated with mobile devices like smartphones. These gadgets can prove promising in the field of training and learning systems with the proliferation of dedicated mobile applications.

Use Cases
Some of the scenarios, in which VR plays a vital role to enable easy learning, are:

The potential for Virtual Reality exists in providing training to the people who have to deal with challenging or physically hazardous tasks. One such case is of flight simulators – used in training pilots and providing the virtual experience of flying a plane before actually doing so. This is done to mitigate risks and considerably, reduce costs involved in training.

Similarly, with the availability of affordable mobile virtual reality gadgets, new types of environments can be created to train people which involve working in high-risk scenarios. They can take training courses to hone their skills in bomb diffuse, deal with hazardous wastes, or work in operation theatres prior to doing them actually, thus avoiding injuries or minimizing risks.

Learning by Virtual Reality can be fun, given the level of immersion a learner experiences. This can be applicable to the current learning environments even more, considering the three-dimensional effect and higher level of interactivity involved. For instance, many educational videos can be transformed into Virtual Reality compatible content. This would bring learners closer to the reality, thereby further increasing the motivation to learn and making such videos more entertaining to watch.
Many times designers find it cumbersome to prepare Computer Aided Designs and 3D models on two-dimensional computer screens. As a result, this often causes learning barriers for the beginners. Incorporation of Virtual Reality into these platforms will, not only, provide better design manipulations but also, facilitate the learning process.

Benefits
In today’s world of limited attention spans, virtual reality plays an important role in providing immediate engagement with the learning system. By making VR experiences truly immersive, distractions are greatly reduced, resulting into more effective learning. Further, there are other benefits associated with VR that include:

**Cost-Saving**
Many training courses involve actual use of resources. However, it so happens that resources are either limited in availability or too expensive to buy in large amounts. In such cases, costs incurred in training become substantial. Moreover, not too many trainers can use them and be trained, simultaneously. By modeling resources or equipment to the last detail, trainers can interact with them and get as real an experience as using actual pieces of equipment. In this way, they hone their skills without having to use them, actually.

**Safety**
Virtual Reality can be of vital use when there are risks involved in getting trained for challenging tasks or potentially dangerous environments. Considering the example of flight simulators, pilots get good hold of flying skills before flying a real plane that help them avoid any fatalities during training. Many aspiring surgeons take advantage of virtual reality to avoid medical accidents.

**Convenience**
Virtual Reality can make work more convenient by saving organizations’ time and money. Workers will not have to travel distances to complete projects and make decisions. For instance, architects from across the globe can collaborate and evaluate designs using VR.
How VR integrates with Learning Systems

There are many mobile VR headsets available in the market today which aim to provide an experience of complete immersion. However, a truly immersive experience comes in when there is an element of interaction. A mobile VR system comprises a device (smartphone) to run the application, a VR headset, and an input controller for interaction with the virtual environment, done through gesture control (HTC touch), head tracking, or on-device buttons (or trackpads).

One of the common features of a Learning Management System (LMS) is a virtual classroom. The ambience of a virtual classroom can, very well, be designed by extending the capabilities of the Gear VR framework. The architecture diagram (figure-1) shows how a typical mobile learning application (an Android application) uses the Gear VR framework, specifically, built for Samsung Gear VR.

The Gear VR framework API provides VR application developers with simplified access to Oculus SDK functionality by means of the Java Native Interface and the Gear VR framework native library. The Java classes, implementing the interface, provide plethora of options to choose from and enable a fully customizable virtual environment to integrate with an existing application.
### Basic Features of Gear VR Framework

The Gear VR framework can be, easily, incorporated into an Android application framework. This enables developers to add the VR component to an existing application without having to restructure it. Fundamentally, incorporating VR into an Android application involves:

1. **Defining the Activity by sub classing GVRActivity**
   - Overriding the onInit method to start the application.
   - Overriding the onTouch method to capture touch events.
   - Supplying XML settings file.

2. **Implementing the VR World by sub classing GVRMain**
   - Overriding the onInit method to construct 3D scene.

3. **Implementing onStep for each frame**
   - Adjusting the SceneObject for each frame.

In addition, every activity, when created, needs an object of GVRViewManager. A GVRViewManager contains a GVRScene that is inherited by a GVRSceneObject. It is the scene object that contains the actual visible VR content. The view manager controls the flow of execution and does task scheduling, 3D rendering and animation. The class diagram (Figure 2) shows how these classes are inherited.

![Figure 2: VR Classification](source: www.gearvr.org)
Conclusion

For mobile VR, to drive mass consumer adoption, it is imperative that not only gadgets be more comfortable and lightweight to use but also, more VR compatible high quality applications be available in universal stores. Additionally, transforming existing content (videos on YouTube™, say) into VR compatible content will provide users with a huge set of options to choose from.

We have discussed the benefits of Virtual Reality in the current and potential learning environments. Combining affordable mobile VR gadgets with eLearning applications, the way of learning can be brought to the next level by having active rather than passive interaction. Making VR experiences truly immersive opens up avenues for understanding complex subjects and theories. This requires, simultaneously, meeting extreme requirements like visual quality, sound quality, and intuitive interactions.

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About RapidValue

A global leader in digital transformation for enterprise providing end-to-end mobility, omni-channel, IoT and cloud solutions. Armed with a large team of experts in consulting, UX design, application development, integration and testing, along with experience delivering projects worldwide, in mobility and cloud, we offer a wide range of services across industry verticals. We deliver services to the world’s top brands, fortune 1000 companies, Multinational companies and emerging start-ups. We have offices in the United States, UK and India.

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