Virtual Reality in the Classroom

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"Virtual reality (VR) was created to fulfill human curiosity about exploring beyond the reality" (Bates-Brkljac, 2012, p.vii). VR allows people to see what the ocean floor looks like, or see other places the average person would otherwise never have the opportunity to explore. It allows students in America to explore the inside of the Taj Maj Hall without having to spend thousands of dollars on a costly trip. It allows individuals in a classroom to experience the weightlessness of walking on the moon. In order for students to get the most out of VR lessons, teachers must not only be well trained, they must also have the knowledge to make it effective and useful in the classroom. As the world advances technologically, educators must become familiar with and utilize this advancing technology in their classrooms. VR has the ability to

enhance lessons far beyond pictures and PowerPoint presentations, using the latest technology to add both educational value and interest.

Needs Identification

Many of us have yet to walk into a classroom where the teacher is utilizing VR to teach a lesson. Some reasons for this include lack of equipment due to inadequate funding, students being unable to provide their own mobile devices for the VR headsets, not having access to VR headsets at all, and more easily remedied, teachers not having the knowledge and training to properly incorporate VR into their lessons.

VR software allows educators to create three-dimensional (3-D) worlds using virtual reality augmentation, giving students the ability to explore, research, define, and investigate. Morgan (2013) feels that viewing 3-D worlds through VR helps students experience environments that are difficult to render in a traditional classroom. Many teachers may be reluctant to employ this resource in their classrooms, most likely due to lack of training with VR, leading to unfamiliarity. The first time most individuals encounter VR headsets is when they are used for gaming. Sadly, the majority of educators are quite unaware of the benefits of using VR in the classroom. Teachers should be introduced to, and allowed to become familiar with, the various types of VR headsets and VR software available. There are many VR options, giving schools a wide variety to choose from to ensure teachers are well-trained.

VR can be used in traditional classrooms as well as in online classes. One of the biggest difficulties for online students is that they would each need their own device loaded with VR software. In the traditional classroom, teachers are able to use devices such as ClassVR, which has headsets and software packaged together. If an educational institution purchases ClassVR,

the institution would have to ensure that its teaching staff knows how to use the equipment, when to use VR, and how to create and choose the worlds, rooms, and environments the students are to explore.

This training addresses an issue that will help solve a growing problem in the classroom; the problem being that not enough teachers are using VR effectively in the classroom. As previously mentioned, the majority of teachers are not familiar with the technology, or which lessons can incorporate the VR resource to enhance the content and engage the students. VR can help solve many problems in the classroom. These problems include students being unable to travel to foreign lands and witness them in person, and the limitations of traditional textbook learning. Seeing real-world situations helps bring to life circumstances and situations that are taught. VR can help explain how everyday students encounter math that they may otherwise feel they might never come across. Brown and Green (2016) mention that VR has provided virtual field trips, has successfully been used for training, and has aided in the development of cultural awareness.

Goal Statement

Upon completion of training using ClassVR and other VR devices, educators will be able to create VR lessons to be used in their classrooms that will enhance their students' learning and provide a more creative and engaging environment.

Tasks Analysis

Educators will be provided with training on how to use ClassVR. Learning how to use this software and equipment will add a refreshing new take on how lessons are taught, and how

students are learning. Educators will also be introduced to other VR technology that can be used in their classrooms. Furthermore, educators will be given the opportunity to construct their own VR headsets. This will enable them to better instruct their students on how to create VR headsets of their own, so that each student will have a personalized, individual headset. Collectively, these tasks will provide educators with the knowledge they will need to successfully utilize VR technology in their classrooms. These tasks will also provide educators with an opportunity to learn a new skill and enhance the overall quality of education that they provide to their students. It is important that educators take advantage of every provided opportunity to become better teachers and provide a better education for their students. Teachers should be knowledgeable and confident about any new equipment they choose to use in their classrooms. Below is a flowchart of the steps it will take to reach the aforementioned goal:

Chart 1: Steps

Below is a chart describing subset steps for each step depicted in Chart 1:

Chart 2: Substeps

Context and Learner Analysis

The individuals attending the training are educators that are interested in using VR technology in their classrooms. They should have prior knowledge of basic computer skills, such as typing and performing searches on the internet, and some background knowledge regarding the use of Office Suite software. They should also have at least some prior research experience with VR. Some of these teachers may have used VR technology on their own, and a few may have even tried it in their classrooms. For others, however, this may be their first exposure to VR technology. These educators want to continue to provide students with quality education, and they understand that one way to do this is to incorporate VR technology into their lessons. These individuals want to learn about the various VR technologies that are available, but also want to practice using them. They want to learn when to use VR and the benefits that can be provided by doing so. Some of these educators are interested in discovering just how they could use VR in their physical classrooms, while the others would like to discover how VR could be exploited in their online classes. Regardless of the reasons, educators are finding that their students communicate, learn, and are exposed to technology on a far higher level than ever before. They would like to enhance their knowledge, skills, and quality of teaching by using new and exciting educational platforms. These teachers use other forms of technology in their classrooms on a regular basis, giving them familiarity with possible technical problems and the solutions to overcome them. However, they want to be able to troubleshoot and prepare for the technical issues they may occur while using VR. They want to learn about both the strengths and weaknesses of using VR.

The training will take place in classroom setting. Each educator should have a laptop or tablet, and their own smartphone to download VR apps. The trainer will provide trainees with

the ClassVR headsets, and computers with the ClassVR software installed will be available. Based on the number of trainees attending, however, they may have to form small groups to utilize these computers. Trainees that have their own VR devices are encouraged to bring them. The trainer will also bring various VR devices for trainees to use and become familiar with.

Instructional Objectives

The below objectives will be used to reach the goal of educators effectively using VR in the classrooms. There are eight steps, however some steps will be grouped together, creating fewer objectives.

Objective 1: Upon completion of training, educators will present to group members three benefits and three weaknesses of using VR in the classroom.

1. Performance – Trainees will discuss as a group the strengths and weaknesses of VR.
2. Conditions – Trainees will form smaller groups to pinpoint the greatest benefit and most restraining weakness of VR.
3. Criteria – Trainees will present their thoughts on the strengths and weaknesses of VR to the rest of the group.
4. Assessment: Participants will be able to name three benefits and three weaknesses of the training assessment with 80% accuracy.

Objective 2: Given the equipment and instructions on how to use ClassVR, educators will construct two virtual worlds that will be used to help enhance three to five lessons in their classrooms.

1. Performance – Trainees will practice using ClassVR headsets along with the software.

2. Conditions – When given a headset, trainees will explore the environment based on the virtual world trainer created using the ClassVR software.

3. Criteria – Trainees will create a lesson using the ClassVR software.

4. Assessment: Participants will teach that lesson using the ClassVR software to the group to demonstrate mastery, and peers will review and make suggestions to improve instruction.

Objective 3: After researching and exploring OpenSim and Second Life, educators will choose no less than ten virtual worlds that they plan to use in their classrooms to enhance the student experience when learning about different environments and foreign lands.

1. Performance - Trainees will practice using various headsets with OpenSim and Second Life software.

2. Conditions – When given a headset, trainees will use their personal devices to explore OpenSim- and Second Life-created virtual reality worlds.

3. Criteria – Trainees will have to create accounts and download the OpenSim and Second Life apps to their mobile devices.

4. Assessment – Participants will select either OpenSim or Second life, successfully create an avatar, and use that avatar to explore OpenSim or Second Life.

Objective 4: Given different options, educators will decide on at least two VR technologies that they would consider using in their classroom.

1. Performance – After using the various presented VR technologies, trainees will decide which VR system is best for their classrooms.

2. Conditions – When given a survey, trainees will rate the VR technologies.

3. Criteria – Trainees will have the option of constructing their own VR headsets.

4. Assessment: To demonstrate mastery, participants will choose one of the VR technologies and explain to their group why and how they would use that tool in the classroom.

Resources

Training will use a variety of VR tools to introduce and educate staff. These tools include Google Cardboard, VR Rigs, OpenSim, Second Life, and ClassVR. Second Life and OpenSim are free VR environments. Google cardboard is a bring-your-own device using student smart phones and a cardboard framework to provide total virtual reality immersion. Google cardboard units are approximately $7.00 per unit, while other VR equipment can range from twenty dollars to several hundred dollars each.

Target Audience

While VR can be used with all age groups, this training is targeted for 6th grade through 8th grade teachers. A separate professional development will be presented to High School and Elementary school staff. The resources and media were chosen with this target audience and the students they teach in mind.

Technology Concerns

While using a bring-your-own device initiative and Google cardboard or some other VR software, students will be able to access a VR environment, however, smart phone availability for every student may prove to be a limiting factor. Additionally, school district firewalls may be a difficult-to-overcome hurdle when installing and utilizing Second Life and OpenSim in the classroom. Many districts have installed the educational version of Minecraft, and utilizing such a virtual reality may provide the necessary student interaction with VR instruction.

Curriculum

Utilizing Virtual Reality in the classroom is a relatively new concept. The curriculum for this professional development utilizes ISTE VR virtual worlds (Wheelcock &Merric, 2015), Google Cardboard VR Field Trip app, ClassVR and instructional manuals on the technology to present the material.to teachers. It is important to note that VR is not being taught as a standalone class, but rather to enrich an already existing classroom experience. Effective use on VR as an instructional tool will enable students to experience a broader array of learning environments.

Individual and Collaborative Activities

Participants will create an avatar and enter either Second Life or OpenSim, and explore one of the virtual reality environments listed in Appendix Two. Working with their group, they will prepare a report on what they discovered, how such an environment can be used in the classroom, and what strengths and weaknesses they saw in the environment.

Assessment Procedures

To determine mastery and effectiveness, education requires evaluation. In a traditional classroom, the procedures used to do this are based on a variety of methods. Portfolios, standardized testing, verbal discussion, presentations, projects, group projects, and even observation enable the teacher to assess student mastery (Alonso-Díaz, & Yuste-Tosina, 2015). However, E-learning brings with it new challenges when it comes to student assessment. Wang (2014) points out the importance of assessment utilizing a formative model comprised of a pre-assessment and a final project to determine overall mastery.

1. At the beginning of the VR Training process, all participants will complete a pre-training assessment (Please see Appendix One for the assessment document). The pre-training assessment will provide a base line to determine how well the participants have mastered the material.

2. Upon completing the initial training, participants will transfer learning by creating and teaching a lesson using one of the VR technologies in the classroom. Participants will be asked to video record the lesson and submit the video with the lesson plan and a one-page reflection on the positive and negative aspects of the lesson.

3. Participants will participate in a school Professional Learning training session on integrating VR technology into the instructional environment.

Time Frame

Each year the district conducts a digital boot camp. The purpose of this boot camp is to introduce methods and tools to help integrate technology into the classroom. This professional training is expected to take at least three days. The Task Force would like to add the VR training to the boot camp curriculum and present it to middle school teachers during that time frame. Digital boot camp takes place during the pre-service days at the beginning of the school year. By conducting the training at this time, classroom disruption is lessened and teachers can implement what they learn in the classroom as soon as the school year begins. Additionally, follow-up activities can be scheduled on teacher in-service days, along with the Professional Learning Committee.

Media Selection

This taskforce will be giving a multitude of various media delivery methods to help facilitate the implementation of VR into a concerted effort in creation of a blended classroom. This method of delivery and analysis will look at the following components associated with a concise view of how to select and utilize the appropriate method to develop their staff: Supports, CPU requirements, bandwidth, media creation, and skillset analysis in both acquisition and implementation will be evaluated through the development process of our Taskforce. The overall goal is to provide a comprehensive list of items and skills necessary to create the most ideal VR experience possible. The media presentation will demonstrate setting up a new account, logging in, and creating an avatar in Second Life. It will also take the viewer on virtual field trips. A trainer will also demonstrate a history lesson. A variety of pictures of VR headsets will be shown and described. The purpose of the media presentation is to show how VR can be used in the classroom, the process that it takes to get set up in a VR environment, and to show comparison of various VR headsets.

The utilization of media in our project will be both asynchronous and visual factors that will be utilized and implemented according to the factors set by the end user. These authors believe that by making the project web-based, we will eliminate many of the costs involved in rolling out massive amounts of discs and instructional books, keeping fiscal demands down for both small and lower tier income districts. The process of implementing VR into a blended classroom is tedious, yet at the same time, quite rewarding. It is also the authors' belief that more students can be reached with the technologies present without having a school-specific medium (Second Life, Edu Minecraft, etc.). This would help facilitate the movement of education in the 21st

century to catch up with students who are craving that their learning would more closely reflect the world in which they live.

Media Requirements

The media requirements are listed as follows:

OpenSim:

- Operating System: Microsoft Windows XP Professional SP3/Vista SP1/Windows 7 Professional
- Processor: 800MHz **Intel Pentium III** or **equivalent**
- Memory: 512 MB.

Second Life

- Internet Connection: Cable or DSL
- Operating System: Windows 7, Windows 8 or Windows 10
- Computer Processor: CPU with SSE2 support, including Intel Pentium 4, Pentium M, Core or Atom, AMD Athlon 64 or later
- Computer Memory: 1 GB or more
- Screen Resolution: 1024x768 pixels

ClassVR:

- App can be downloaded through AppleStore for apple devices or PlayStore for Android devices

- Internet Connection: Cable or DSL
- Operating System: Windows 7, Windows 8 or Windows 10
- Computer Processor: CPU with SSE2 support, including Intel Pentium 4, Pentium M, Core or Atom, AMD Athlon 64 or later
- Computer Memory: 1 GB or more
- Screen Resolution: 1024x768 pixels

Skills Required

Educators are expected to have above basic computer skills. They should be familiar with creating avatars, setting up accounts, and proper login procedures. They should be able to recognize when they are in a VR environment, and should be able to follow instructions given through videos or handouts.

Conclusion

The goal of the project is to introduce VR, explain its purpose in the classroom, and provide examples that educators can use when teaching their lessons. This document is designed to explain the rationale for using VR in the classroom, and the benefits of doing so. This team hopes that educators will familiarize themselves with VR and utilize this valuable resource in the classroom. The authors believe that students immersed in VR-enabled classrooms will find themselves fully engaged in the lesson when VR is used to explore new and different worlds or environments. Furthermore, the authors are certain that teachers will see an increase in academic achievement due to the use of VR.

As with all technology, there are strengths and weaknesses. The greatest barrier in using VR in the classroom is the likelihood that each student does not have access to the technology,

because they may not have their own device or smartphone. As a standalone device, ClassVR solves this problem, as it does not require students to supply their own device. Another VR resource mentioned was Second Life. Although this resource can be very educational, and even evangelical (people use it for church service), it does have a "dark side" that parents and teachers must be aware of. If teachers decide to use Second Life, it should not be used outside of the classroom. Additionally, teachers must be very specific as to which worlds or environments they wish their students to explore. ClassVR eliminates the risk of students exploring environments in Second Life that they should not, due to the fact that the teacher specifically chooses (or creates) the environments that students explore. Hicks (2016) mentions five disadvantages to using virtual reality in the classroom:

1. Deteriorates human connections
2. Lack of flexibility
3. Functionality issues
4. Addiction to the virtual world
5. Cost

Hicks (2016) also mentioned six advantages to using VR in the classroom:

1. Provides outstanding visualizations that aren't possible in the traditional classroom
2. Creates interest
3. Increases students' engagement
4. Doesn't feel like work
5. Improves the quality of education in different fields
6. Eliminates the language barrier

The major benefit of VR is the ability to explore locations, buildings, or attractions without stepping foot outside the room. VR allows students to look beyond their world, offering them a view into other worlds that they would never otherwise have. As they see and interact with the environments that they are learning about, visual learners will benefit tremendously from VR and the immersion that comes with it. Auditory learners will able to hear the unique sounds of

various environments, allowing them to become further engaged in the corresponding lesson. VR has the potential to take learning to a whole new level. When used properly, effectively, and appropriately, students will retain more information and find themselves fully engaged and enjoying the learning process.

References

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Appendix One

VR Training Pre-Assessment

Answer the questions as honestly as you can.

1. Do you have a computer at home? Do you own a laptop, too? How long ago did you get the computer(s)? How many computers do you have?

2. Do you use a tablet, iPad or a smart phone? How many minutes a day do you use each of them?

3. How many hours per week, on average, do you use a computer?

4. What kinds of Internet access do you have at home?

- None
- DSL
- Modem
- Cable modem

- Don’t know about Internet

5.How many hours per week, on average, do you surf the Internet? For what purposes do you use the Internet?

6. How many hours per week, on average, do you use email? For what purpose(s) do you use email?

7. How many hours per week, on average, do you use online discussion boards (e.g. e-groups, computer based PLCs etc…)? What kinds of discussion boards do you use?

8. How much experience do you have with Virtual Reality environments (e.g. OpenSim, Second Life, massive multiplayer online game (MMOG), Google Card Board, Virtual Reality Head Gear, Total immersion Virtual Reality, cave automatic virtual environment (CAVE), Immersa-Desk, Disney Quest, 3D movie)?

- Once
- Daily
- Weekly

o Monthly

o Never, but I have heard of it

o Never Heard of Virtual Reality

9. Please rate which technology you are more comfortable with. (1. Extremely comfortable, 2. Fairly comfortable, 3. Somewhat comfortable, 4. Not comfortable, 5. Don't know or never used)

Email __ Discussion boards __

Chat room __ Video conferencing __

Virtual reality __ Smart Phones ___

10. Please rate which technology you would be more interested in using or learning. (1. Extremely interested, 2. Fairly interested, 3. Somewhat interested, 4. Not interested, 5. Don't know)

Email __ Discussion boards __ Chat room __

Video conferencing __ Virtual reality __ Tablets ___

11. What technologies, if any, have you used in your classroom previously or are using currently?

_____

_____

_____

12. Have you ever used Virtual Reality in any of the following ways?

Student _____ Teacher____ Personal____

13. How often have you ever used Virtual Reality in the classroom?

Never____ Monthly ___ Weekly _____ Daily_____ Once a Semester____

14. What is your goal in participating in this Professional Development?

_____

_____

_____

Appendix Two

Educational Sites in Second Life

The International Society for Technology in Education (ISTE) has four islands in Second Life. They have socials every Thursday at 6 pm SLT (9 pm Eastern). ISTE also frequently has speakers on Tuesdays. During NECC's annual conference this year, the user can attend events here in Second Life. Many of ISTE's affiliates have headquarters on these islands. For events: http://secondlife.iste.wikispaces.ne

The **International Space Flight Museum** has a tremendous display of rockets and areas to watch NASA videos. Additionally, the user even has the opportunity to ride a rocket or observe planet alignments of the past and future. The Museum hosts exhibits and conducts events. To keep up to date on events, please see the following: http://slispaceflightmuseum.org/drupal

OpenSim

- Kitely
- Active Worlds
- Quest Atlantis Remixed

Other Virtual Reality resources include Minecraft, World of Warcraft, Unity, Oculus Rift, and Hololens (Wheelock, & Merrick, 2015).

Additional Sites for Further Information

The above link is to a database of Google expedition VR tours, for the Google Cardboard. It is a google sheets document:
https://docs.google.com/spreadsheets/d/1uwWvAzAiQDueKXkxvqF6rS84oae2AU7eD8bhxzJ9SdY/edit?usp=sharing

This site lets allows subjects to be searched more specifically to ensure appropriate VR tours:
https://www.aquilaeducation.com/expeditions-search

Links to Media Presentation and Collaboration Sessions

The following link will show a media presentation about using VR in the classroom; This link also shows the module lesson which is tagged "Curriculum Ideas - Mobile Lesson":

https://dglaser36.wixsite.com/vrclassroom

The following links are the two recorded live collaboration sessions:

First Session September 22, 2017: https://youtu.be/YRvAJYJmHCQ

Second Session October 3, 2017: https://youtu.be/dVbSXmiUm2U