

Virtual Reality Films in the Classroom

Stella Evans

Introduction

Teachers have been showing movies in the classroom for a very long time. They are shown in elementary schools, middle schools, high schools, and even colleges. They are shown as an entertaining reward. They are used to introduce topics. They are used to reinforce ideas. They are used to take our students to places they haven't been.

Most of the students at Anna P. Mote Elementary School have limited experiences outside of their local neighborhoods. Many of them come from low-income families. All of their families work hard to provide the essentials. There isn't time or money for travel. They don't come to school with the same background knowledge their more affluent counterparts do. We need to develop all the background knowledge needed for them to be successful right there in the classroom.

In this unit I will examine the usefulness of movies in education. Are they a useful tool or a way to fill our students' time? In particular, I will examine virtual reality films in our classrooms. Are they a useful tool or a way to fill our students' time? In particular, I will examine virtual reality films in our classrooms. Is this a way to engage our students even more fully in a topic, or is it an expensive toy?

Demographics

Anna P. Mote is an elementary school in the suburbs of Wilmington, Delaware. There are approximately 400 students enrolled. According to data from the 2015-2016 Delaware Department of Education School Profile report,¹ 56% of our students are Hispanic/Latino. 35% of the students are English language learners, and 57% come from low-income households. While the state and district suspension rates are 13% and 12% respectively, only 5% of the students at Mote had been suspended last year.

The spring assessments were concerning. According to the state website,² our students' test scores were low. At the third grade level, students showed 28% proficiency in reading and 11% proficiency in math. In fourth grade, in Reading, our students showed only 28% proficiency and 22% in Math. The fifth graders did better in Reading with 50% proficiency, but their math scores were at 12% proficiency.

I am the technology teacher and Library/Media Specialist at Mote. I see all students for 50 minutes a week as part of the students' related arts rotation. Additionally, fourth and fifth graders have an elective period one day each week. For this elective, students

are allowed to choose which related arts activity they would like to participate in for the marking period. Students can choose Physical Education, which offers activities like a Dance Off, Survivor, or Soccer. The Music teacher holds chorus practice that prepares students for school concerts and district events. The art teacher offers papier maché sculpting, sewing, and maze building. In technology, I have offered programming with Scratch, digital photography, and website building.

Rationale

Elementary schools show students movies for many reasons. They are used as introductions to units to give students the backgrounds that may not have. Movies can activate curiosity about subjects students don't have knowledge of. Movies are sometimes shown after students read a text as a comparison to books. Movies are used as rewards.

Recently, short films have been created that allow students to use virtual reality goggles (Google Cardboard) to put themselves into the movies. As a narrator tells a story, viewers look in all directions to see the world that the presenter is living in. For example, "Clouds over Sidra" tells the story of a young girl in a Syrian refugee camp.

Over the last few years, more and more companies have joined the world of VR in education. Nearpod, Inc. has launched a series of virtual-reality lessons that enable students to watch VR movies, record their own movies, and share text with their classmates. Immersive VR Education creates lessons that places students in the middle of a VR environment in which they must complete specific tasks to complete the activity, Alchemy VR, in a partnership with Google, creates VR Experiences for Google's Expedition program that allows students to take virtual field trips around the world to experience for themselves the places they read about.

Researchers have shown that students will remember 30% of what they see in pictures, but they will remember 90% of what they do. Other research shows that students learn better when they are emotionally invested in the topic and lesson. Placing students in situations will help them become more invested what they are learning. As they are watching films, we want to know how the students are responding to what they see. What do they feel as they are watching these films? Can they relate more or less to the people in films they view through the viewers than to those they see two-dimensional screens? Will they be inspired to learn more about topics, people, and places the experience through VR glasses?

In this unit, I will examine a range of VR resources currently available. I will find the research that addresses the use of virtual reality in the classroom. I will identify the most promising resources to use with VR glasses.

Movies in the Classroom

There have been quite a few studies done about using movies in elementary classrooms. These studies generally agree that movies are often not used for educational purposes, a development that has negative effects on all film viewing. When students see movies as a fun activity, they often turn their brains off (Needleman 2010). Ideally, students should think about watching movies the way they think about reading a book: it should be just as rigorous. Students should be fully engaged in the film, and their teachers should be as well. They should be actively involved with their students, ready to pause, rewind, and answer questions about the film.

According to a study done by Renee Hobbs (Hobbs 2006), there are many non-optimal uses of video in classrooms. They are used to give teachers breaks, to give students rewards, to control student behavior, and to allow teachers to disengage mentally from their students. Hobbs found that some teachers are using movies to present content in science or social studies, but even these teachers give little thought to the educational goals and objectives behind these practices.

There are many ways that films and film clips should be used in the classroom. Needleman (Needleman 2010) discusses specific strategies for using films effectively. He encourages teachers to show movies at the beginning of units rather than the end so that the students gain some background knowledge of a topic and refer back to those ideas and make connections as their learning deepens.

Teachers should set up clear expectations for the ways students take notes, make connections with the movie, ask questions, and stay connected. These expectations should apply to teachers as well. Finally, rather than answering all of the students' questions, teachers should create a KWL chart and research the questions they still have.

Two further considerations must be taken into account when showing movies in an elementary school. Teachers must consider where or not the content is appropriate. There have been many cases across the country where school districts are sued because of the content shown in a movie.³ Finally, teachers must consider the permissibility of showing films in the classroom. Teachers are allowed to show films in face-to-face classes in non-profit educational settings as long as the films have been obtained through legal means. This arrangement does not allow teachers to post clips of protected material to a learning management system for students to watch at home or other off-campus locations.

Virtual Reality Films

Virtual Reality films are a truly constructivist way to teach. Based on work by Piaget, constructivism maintains that learning happens when we experience things and then reflect on those experiences. We actively create new knowledge when we filter those

experiences through what we already know, ask questions, and then build understanding (<http://www.thirteen.org/edonline/concept2class/constructivism/>). Virtual reality is exactly this type of learning.

Many students struggle in school because much of what they are learning relies on symbolic representations of what they need to learn. Students often struggle to make connections between those symbols and the real world. Virtual reality eliminates the symbols. The students see virtual representations of the objects they are learning about [4]. Students enter the world they are studying and can view objects from all angles. They can enter a city and view it from a distance or walk the streets. Rather than sitting and listening to a lecture or reading a text, students are actively engaged with the topic.

Virtual Reality may be the answer to the diminishing attention span of our students. While we complain about how our students have shorter and shorter attention spans, we don't change our teaching methods. We expect them to change. This isn't going to happen. However, we know that students can become hyperfocused when they are playing video games. Research has shown that students remember 20% of what they hear, 30% of what they see, and 90% of what they do.⁵ Virtual reality is as close to doing as we can get in a classroom. We may not be able to take our students physically to the Great Wall of China, but we can walk on that wall through VR goggles. Space travel is beyond our reach, but we can experience it through VR.

According to a study of 20 elementary schools in Ireland, VR had social benefits as well as educational benefits.⁶ Many of the socially awkward and shy students mastered the technology and were able to help their peers in using it. Students who had learning disabilities were just as successful as their peers with this learning method. Physical disabilities were not an issue; all students could participate equally.

On the other hand, there are barriers to using virtual reality in classrooms. The Brookings Institute (Mann) discuss several barriers to using this technology in education. First is the cost of the equipment. While Google Cardboard can be inexpensive, the devices needed to run the programs can be quite expensive. Second is the teachers' ability to use the technology. It can be daunting to introduce a new technology in a classroom if a teacher isn't familiar with it. There may be glitches that the teacher cannot fix. It takes time to become comfortable with a new way of teaching. Third, the VR market is still new and developing. In order to create lessons, teachers need to search for materials and develop plans themselves. The materials available are of varying quality, and teachers need to sift through them to find what they are looking for. Finally, I have found through my own experience that I need to invest a lot of time to put everything together. Devices need to be prepared. Materials need to be found or developed. Everything needs to be charged and ready every day for my classes. As devices age, they don't hold enough charge for a day's worth of classes, and I need to charge them throughout the day.

Commented [Office1]: This isn't the time or the place for a debate about this proposition, which I find highly debatable.

Commented [Office2]: You don't need both the parenthetical reference and the endnote. Take your pick.

Commented [Office3]: An exceptionally pointed and powerful summary of the problem.

The results, however, are worth the effort. When students put on their goggles, they are transported to places they would otherwise never go. They can swim with sharks or walk on the moon. They can listen to a girl in a refugee camp or stand in front of the Mona Lisa. They can experience a lifetime's travel from their classroom.

Commented [Office4]: Why would VR enhance the experience of looking at a photograph of the Mona Lisa, which is after all a two-dimensional object?

Virtual Reality Products

Google Expeditions - <https://www.google.com/edu/expeditions/>

Google Expeditions is a VR management tool. Google has compiled a collection of VR clips and created many different lessons. The teacher loads a lesson onto an iPad and the student devices connect to it. The teacher controls the class by selecting the images the students view, directing the students to look at items she or he wants them to see, and setting the pace as she scrolls through the clips.

This program is free to use. Google provides the app through the google play or apple app stores. All the content is contained in the app. Information on the images being viewed is available on the teacher's iPad, and she can instruct the students as they view the images.

Nearpod - <https://nearpod.com/>

Nearpod Inc. is a company that has been creating multimedia lessons for classrooms. They use videos, presentations, and interactive activities to present content to students. This year, they began adding Virtual Reality content to their lessons.

Nearpod is not free. While they have some "lite" lessons that are free, most cost from \$2.99 for individual lessons to \$49.99 for units. Schools and districts can purchase licenses for unlimited educational use.

zSpace - <http://zspace.com/>

zSpace combines Virtual Reality and Augmented Reality to bring lessons to life. This system allows students to manipulate objects as they learn about them. zSpace requires its own computers, glasses, and stylus.

While this is a highly interactive and engaging system, it is limited. The hardware is compatible only with zSpace's content. It is also very expensive. Although it can be used to teach high school biology effectively so that students can virtually dissect many different animals, I don't feel it is the right choice for elementary schools.

Engage Immersive VR Education - <http://immersivvrededucation.com/>

This is one of the newest platforms available for Virtual Reality. This system allows users to interact with the content through the use of game controllers. It allows for distance learning applications, as well as viewing prepared lessons. Since this platform is

new, there aren't many lessons available, but the ones that are there are very well done. At this time, the content is free to download and use.

Lessons

For this unit, I will be developing lessons to be used with 5th graders. From the Next Generation Science Standards, I will be using the 5th grade Storyline, Unit 4. This standard examines the Earth's place in the solar system. I expect the unit to take 6 weeks to complete.

The topic of the solar system has been moved several times from grade to grade. There will probably be varying levels of familiarity with the topic. I will be building students' knowledge from the ground up. While the specific standards are about the earth's place in the solar system rather than the solar system itself, I will begin here on the solar system and then in a later unit focus in on the earth.

I will first show an introductory video about the solar system. There are many choices on YouTube. There are short two-minute explanations about the Earth's place in the universe and the relative size of the planets, and there are full length documentaries about the solar system. These videos can be accessed for free. Our district subscribes to Discovery Education, which has many videos on the Solar system. I will use videos and clips from a few documentaries to build the students' knowledge of the sun, the planets, and the stars.

I will use a lesson from Nearpod to build on students' knowledge of the Solar System. There are several to choose from that cost \$2.99, and I have chosen an introductory lesson to build on their knowledge of the Solar System.

I will choose expeditions from the program "Google Expeditions" that relate to the planets. There is an expedition on the Solar System, one on Astronomy, one on the Moon, and two relating to space travel artifacts. I plan on using all of them to teach this unit.

After the students have explored the solar system through film clips, Nearpod, and Google Expeditions, they will create a Google Slides presentation about what they have learned.

While this unit focuses on one standard in the 5th grade NGSS storyline, it can be adapted to fit many different topics.

Lesson 1

I will begin the lesson by creating a KWL chart about the solar system (Appendix A). Students will have varying degrees of experience with this topic because it has moved across grade levels several times in Delaware. I will create a large chart for the class, and students will each have a personal KWL chart. Students will be adding to their KWL chart at the end of every session.

Students will watch “Real World Science: Our Solar System,”⁷ a video available from Discovery Education’s website. This video discusses the objects that can be found in our solar system. As students watch, they will use the Note Taking Tool to collect information on the objects found in our solar system. I will stop the video at the end of every segment and when important points are made to point out what facts are important and to give the students time to make notes on their charts.

Lesson 2

When students return, we will review what they have completed on the KWL chart. I will tell them that today we will explore the Solar System through the use of Nearpod, a program that uses a multimedia approach to teaching a variety of subjects. While Nearpod has some solar system lessons for free, none of these is appropriate for 5th graders. The Introduction to the Solar System lesson for 5th through 8th grade students costs \$2.99.

In this lesson, students will access a lesson through the Nearpod website using a code I will provide them. They will take a pretest before they begin and a posttest after the lesson to see what they have learned. They will review vocabulary, read a passage about the solar system, and watch a video. There are links to other materials for those that are finished and ready to move on.

Students will continue to collect information on the note taking tool (Appendix B) they began last week.

Lesson 3

Students will travel through the solar system using Google Expeditions and Google Cardboard. The app is free and should be downloaded on a tablet and student devices. The tablet controls what the student devices see.

The tablet will search for student devices to connect to the expedition. I will choose the expedition, in this case “Solar System,” and the same expedition will open on the student devices. I will move the students along through the expedition at the pace I feel is needed.

The app allows me to point to the planets I want the students to look at. It will tell me how many of the students are looking at that planet so I can redirect the students as needed. The app provides background information and questions to ask the students. There are eight scenes in this expedition that describe the solar system, how it was formed, and what objects it contains. Students will once again add information to their Note Taking Tools.

If there is time, I will take the students on an expedition to the moon. This expedition has eight scenes that examine the moon through photos and telescope images. We will look at the earth as it looks from space. We will see images from the lunar landings. We will learn about the space race of today.

Lesson 4

The students will choose one of the planets and collect information on that planet from the Note Taking Tool, Discovery Education videos, and google. They will find the information on the Solar System and the planet they choose and enter it in the chart on the “Planets and Solar System Facts” sheet (Appendix C).

Lessons 5 and 6

Students will use the information they gathered to create a Google Slides presentation. They will use the Directions and Rubric (Appendix D) to create six slides describing the Solar System and the planet they have chosen. Working either individually or in groups, students will use pictures, videos, and the information they collected in the previous sessions to create a multimedia presentation. Using Google Slides and sharing the presentations allows students to share the work and work on different slides in the same presentation simultaneously. Students will present their slides to the class.

Commented [Office5]: All six of your lessons follow persuasively from your general rationale and build logically from each other. Your closing activity is my favorite because, as the details you provide in Appendix D indicate, it combines elements of summary, climax, and active participation. But it might be even stronger if you added a new paragraph of a sentence or two indicating what sort of takeaway this last activity helped the unit as a whole achieve. Once you've added this little wrap-up and accepted all the marginal changes except the ones you don't want to accept, the unit should be ready for next month.

Standards

CCSS.ELA-LITERACY.SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.5.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

5-ESS1-1 Next Generation Science Standards - Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.

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Supplemental Reading List

<http://blogs.wsj.com/digits/2016/02/11/virtual-reality-learns-how-to-get-into-the-classroom/#:YYAZwG3V2GkQGA> – An opinion piece about using Virtual Reality in classrooms.

<http://www.smithsonianmag.com/innovation/how-can-schools-use-virtual-reality-180957974/> How Google and Virtual Reality are making lessons more engaging and keeping students more attentive.

<http://techcrunch.com/2016/01/23/when-virtual-reality-meets-education/> An opinion piece about how virtual reality is bridging culture gaps by allowing students glimpses into other cultures.

<http://www.teachhub.com/making-most-out-movies-classroom>

<http://www.teachhub.com/using-movies-increase-student-learning>

<http://lessonplanspage.com/engaging-strategies-for-showing-films-in-class/>

<https://teachingexcellenceprogram.wordpress.com/2013/05/29/award-winning-ways-to-use-movies-in-the-classroom-2/>

<https://unimersiv.com/vr-education-why-should-we-employ-virtual-reality-in-education/>

<http://www.hypergridbusiness.com/2014/09/5-ways-virtual-reality-will-change-education/>

<http://earthlab.uoi.gr/theite/index.php/theite/article/viewFile/22/17>

<http://www.smithsonianmag.com/innovation/how-can-schools-use-virtual-reality-180957974/?no-ist>

<http://www.usnews.com/opinion/articles/2016-10-05/can-virtual-reality-improve-education>

<http://fortune.com/2016/02/25/school-districts-teaching-through-virtual-reality/>

<https://www.brookings.edu/blog/techtank/2016/09/01/is-virtual-reality-ready-for-school/>

<http://www.centerdigitaled.com/k-12/Virtual-Reality-in-K-12-Education-Is-It-Really-Helpful.html>

<http://creatinglifelonglearners.com/?p=695> – The Right Way to Show Movies in Class

<http://www.ala.org/advocacy/sites/ala.org.advocacy/files/content/copyright/fairuse/web-digital%20delivery%20in%20classroomrev3psa.pdf> – Legalities of using movies and movie clips with students

<http://newswise.com/articles/movies-in-the-classroom-time-filler-or-teaching-tool>

[http://mediaeducationlab.com/sites/mediaeducationlab.com/files/Non-optimal video classroom.pdf](http://mediaeducationlab.com/sites/mediaeducationlab.com/files/Non-optimal%20video%20classroom.pdf)

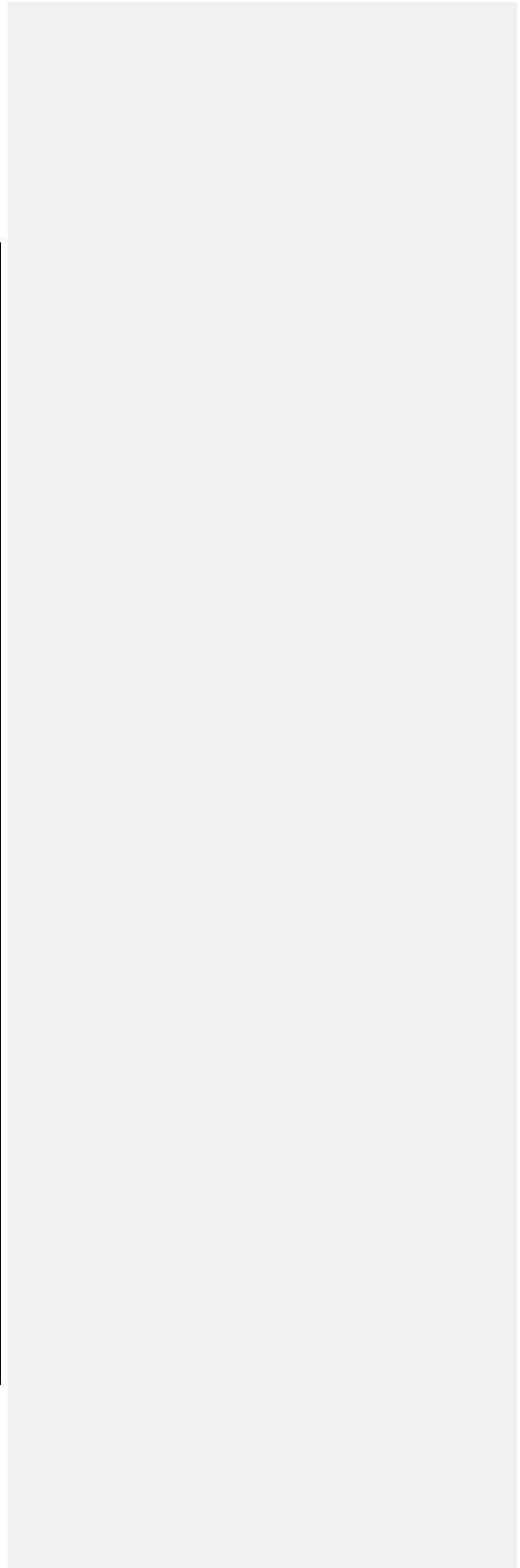
<http://www.thirteen.org/edonline/concept2class/constructivism/>

<http://www.doe.k12.de.us/cms/lib09/DE01922744/Centricity/Domain/391/storyline.pdf> - science standards

Commented [Office6]: As I'm sure you know already, this is fine as far as it goes. Your assessment of the current state of video use in classrooms is depressingly accurate and well-documented. Your rationale for introducing VR to the classroom is direct, economical, and forceful. Your survey of the existing resources and their individual advantages and disadvantages is impressively comprehensive. So far, so good. As far as I can tell, your energy began to flag around page 5 of this draft, when your spelling and punctuation start getting uncharacteristically sloppy. The resulting slips are trivial, but they do suggest that you were losing your focus. On the hypothesis that your running out of steam was something more than simple weariness, I'd suggest that it might have had something to do with the gap between your retrospective diagnosis of the pedagogical problems and potential resources, which is notable for its confident energy, and your prospective tentativeness about exactly what you wanted to use your chosen resources to do in the classroom. Unlike you (I assume), I see your uncertainty as a productive marker of a crossroads that could beckon you in any of several different directions. You could submit, and ask your students to submit, to the VR representation of the solar system as if it corresponded literally to the actual solar system and rely on its intensification of their experience to drive home factual information about Earth's place in the solar system. You could invite them to consider more critically the ways VR did and didn't make them feel as if they were actually in outer space (cf. 3-D projections of the film *Gravity*). You could suggest specific ways VR did and didn't mark immersive advances over traditional movies and TV and ask students to reflect on those differences. You could ask them how much of what they'd learned and remembered depended on this new technology. You could invite them to brainstorm still newer blue-sky technologies that might take other students and visitors still deeper into the mysteries of the solar system. There are probably many other possibilities as well. The primary decision you'll need to make, I think, is between (1) using the new technology as a teaching aid, buying into its affordances and limitations wholeheartedly, and letting it do its immersive thing, and (2) turning a critical eye on the technology even as you're using it, however completely you invite students to share that critical attitude and question what they're experiencing. My own inclination, as I'm sure you won't be surprised to learn, would take me in the second of these two directions, turning a considerably more critical eye on the propositions you advance in the last paragraph of your section "Virtual Reality Films." But you may incline toward the first yourself, especially given the limited sophistication of your fifth-graders and the greater need to teach facts about the solar system than to inculcate a critical skepticism about any of the technologies (the telescope, the rocket launcher, VR systems) that enable us to gather that information. Whatever you decide, I'm certain that many teachers at many levels across many disciplines will welcome the up-to-the-minute introduction to VR you've provided here with open arms and profound gratitude.

Appendix A

What I Know	What I Want To Know	What I Have Learned



Appendix B
Solar System

Milky Way

Mercury

Venus

Earth

Mars

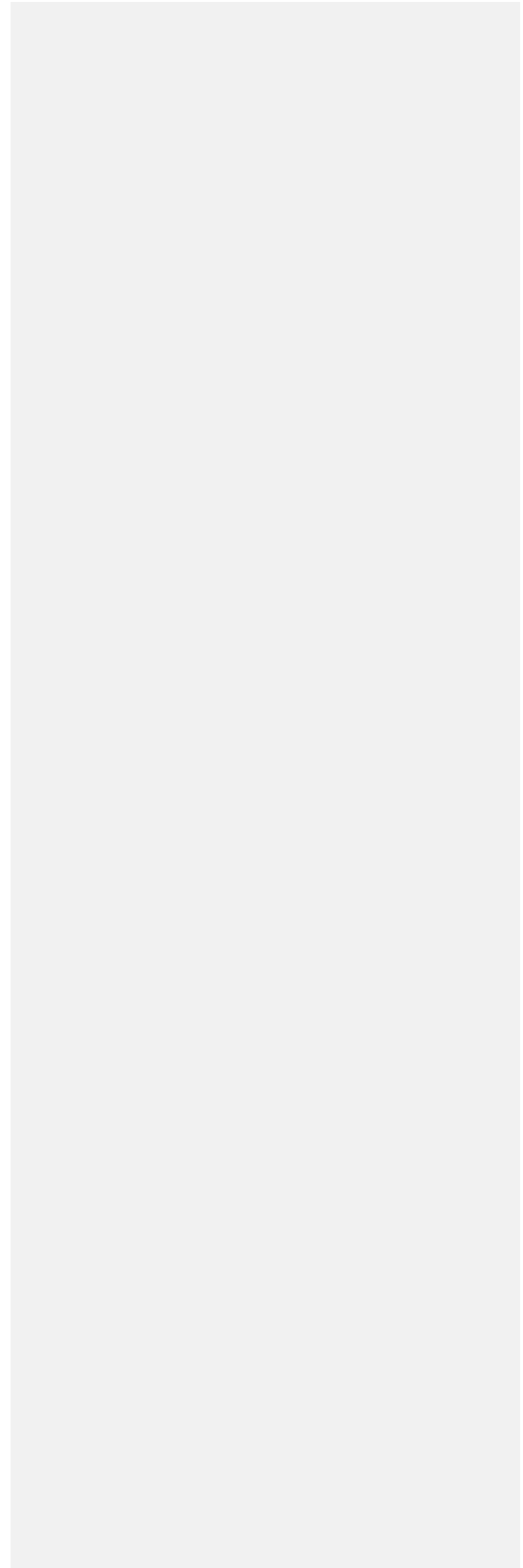
Jupiter

Saturn

Uranus

Neptune

Miscellaneous



Appendix C

Which planet will you study? _____

1. Order from the sun	
2. Distance from the sun	
3. Diameter	
4. How long to orbit the sun	
5. Number of Moons	
6. Atmosphere	
7. Where did it get its name	
8. Spacecraft missions to this planet	
9. Fun Facts	

Appendix D

Google Slides Presentation Directions

Slide 1

Title Slide- This slide should include the name of your planet, your name, and two pictures of the planet.

Slide 2 - Arrange facts #1-4 on this slide in an interesting manner. Include a chart that shows a fact about your planet of the solar system. This can be a chart you create or one you find on the internet.

Slide 3 - Arrange Facts #5-7 on this slide in an interesting manner. Embed a video that talks about one of these facts. It can be a video from Youtube, Discovery Education, or a video you create. **BONUS POINTS IF YOU CREATE THE VIDEO YOURSELF!**

Slide 4 - Using Fact #8, tell me about the space missions that have been sent to this planet. What have they learned about this planet from those missions? Include a picture from one of those missions if it is available.

Slide 5 - At least two additional facts about your planet.

Slide 6 – At least two facts about the solar system from the Note Taking Tool.

	0 No information provided	1 Very little information provided	2 Some information provided	3 Most of the information Provided	4 All information provided
Slide 1					
Slide 2					
Slide 3					
Slide 4					
Slide 5					
Slide 6					

Appendix E

Tips for using Google Slides

1. Choose to create a blank presentations
2. From the right side margin, choose a theme for your presentation. Don't worry if you change your mind later, you can easily change it!
3. To add pictures, choose "Insert" then "Image" from the menu bar. Next choose "Search to get to a google text box. Type the name of your planet in the text box. Select the image you want and choose "select". You can change the size of the picture by using the blue boxes on the sides of the image. You can move the image by hovering over the image clicking and dragging the image.
4. You can replace an image by righting clicking on it and selecting "Replace Image".
5. To add slides, select the "+" button from the submenu bar. If you drop down the arrow next to the "+" button, you can choose the layout of the new slide.
6. To use an image of your planet as the background of a slide. Select "Background" from the submenu. Select "Choose" next to "image". You can "upload one from your photos or search for one from the internet.
7. Select "Tools" and then "Explore to search the internet for information or more images about your planet.
8. Choose "Comments" from the menu bar to communicate with your partner. Make sure you're reading the comments your partner has left for you.

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²https://pubapps.doe.k12.de.us/DSARA_Public/SchoolSumMenu.aspx?s=264 (Accessed 9/10/16).

³ James Daly, *Teachers Get Flak for Showing Flicks* (I'd either include full publication information for this and the following four notes or omit all five titles, which you already list in your bibliography, and give only the authors' names and, if applicable, the page numbers here).

⁴ Veronica S. Pantelidis, *Reasons to Use Virtual Reality in Education and Training Courses and a Model to Determine When to Use Virtual Reality*.

⁵ Casey Sapp, *How Virtual Reality Can Close Learning Gaps in Your Classroom*.

⁶ Kate Abrosimova, *5 ways virtual reality will change education*.

⁷ Mazzarella Educational Media. *Real World Science: Our Solar System*.