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Virtual Reality 5

Virtual Reality in the Classroom

Instructional Systems Design 9471

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VR 5 Team Responsibilities

VR 5 Member	Primary Roll	Contributions
Kristen Beckler	Project Manager	● Team Leader ● Main contributor of course content ● Appendix A/B, Table of Contents, References and Artifacts ● Broad Goals and Big Ideas ● Task Analysis ● Learner Analysis ● Implementation Plan, Including Schedule ● Materials for Training Program
Aaron Scully	Team Member	● Valuable contributor to all sections ● Main contributor of course content ● Appendix A/B, Table of Contents, References and Artifacts ● Needs Assessment ● Learner Analysis ● Types of Learning Experiences and Instruction Table ● Contextual Analysis ● Summative Evaluation
Kim Zayas-Scott	Team Member	● Valuable contributor to all sections ● Main contributor of course content ● Appendix A/B, Table of Contents, References and Artifacts ● Broad Goals and Big Ideas ● Learning Objectives ● Learner Analysis ● Types of Learning Experiences and Instruction Table ● Formative Evaluation
Kathleen Beardsell	Team Member	● Valuable contributor to all sections ● Main contributor of course content ● Appendix A/B, Table of Contents, References and Artifacts ● Learning Objectives ● Needs Assessment ● Implementation Plan, Including Schedule ● Contextual Analysis
Joshua Davis	Team Member	● Valuable contributor to all sections ● Main contributor of course content ● Appendix A/B, Table of Contents, References and Artifacts ● Broad Goals and Big Ideas ● Task Analysis ● Contextual Analysis ● Formative Evaluation

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I. Desired Results

I-A. Broad Goals and Big Ideas

With advancements in technology and Virtual Reality (VR) becoming affordable with the option to use Google Cardboard, it makes sense to incorporate VR lessons in the classroom. Our goal is to design instruction for 6th grade to 12th grade educators who are interested in implementing VR in their classrooms in order to further engage students in active learning for deeper cultural and content understanding, new perspectives and thoughtful analysis. As different training mentalities are required for delivery of elementary and middle school instruction, we have decided to focus solely on the upper K-12 grade levels for the purpose of this training.

The training program will provide educators with the knowledge and tools they will need to introduce VR into the classroom. VR in the classroom when used properly can provide students with an active learning experience, immersion into subject matter, engagement, hands-on approach as well as meeting the needs of many types of learners.

The instruction will take place over the course of two days in a face-to-face setting. On the first day, educators will be exposed to examples using VR in the classroom. Additionally, participants will have the opportunity to brainstorm with colleagues to determine current subject matter that would be best suited for this type of teaching/learning method. On the second day, the educators will develop and implement their own plans for a VR experience. They will then have the opportunity for peer reviews of their initial product with additional evaluation from the instructional team.

Goal 1: Educators will be able to access and create virtual field trip lessons with proficient use of Google Expeditions.

Goal 2: Educators will be able to access and create lessons with proficient use of NY Times virtual reality videos and stories.

Goal 3: Educators will be able to access and create lessons with proficient use of 3D virtual models.

Goal 4: Educators will be able to access and create lessons with proficient use of Google Street View.

I-B. Learning Objectives

Goal 1:   Educators will be able to access and create virtual field trip lessons with proficient use of Google Expeditions.

1.1 Following a presentation, each educator will successfully download and open the Google Expeditions app on a device.

1.2 Following a presentation, each educator will check their Wi-Fi connection on their device.

1.3 Following a presentation, each educator will place their device in Google Cardboard to view Google Expeditions in VR demo mode.

1.4 Following a presentation, each educator will join an Expedition that is already in progress.

1.5 Following a presentation, each educator will search, select, and download a Google Expeditions field trip to lead.

1.6 Following a presentation, each educator will identify themselves as the guide role in the Expedition.

1.7 Following a presentation, each educator will start a Scene and navigate between scenes.

1.8 Following a presentation, each educator will freeze the screen and focus on a location.

1.9 Following a presentation, each educator will end an Expedition.

1.10 Following a presentation and hands-on group activities, each educator will identify a Google Expedition that can be used in their grade level curriculum.

1.11 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a Google Expeditions field trip.

1.12 Following creation of a lesson plan incorporating a Google Expeditions field trip, each educator will present their lesson plan to peers for small group evaluation.

1.13 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

Goal 2: Educators will be able to access and create lessons with proficient use of NY Times virtual reality videos and stories.

2.1 Following a presentation, each educator will download and open the New York Times VR app on a device.

2.2 Following a presentation, each educator will access 360° videos and stories through New York Times VR.

2.3 Following a presentation, each educator will place their device in Google Cardboard to view New York Times VR in VR mode.

2.4 Following a presentation and hands-on group activities, each educator will identify a 360° video or story that can be used in their grade level curriculum.

2.5 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a 360° virtual reality video or story experience.

2.6 Following creation of a lesson plan incorporating a 360° virtual reality video or story experience, each educator will present their lesson plan to peers for small group evaluation.

2.7 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

Goal 3: Educators will be able to access and create lessons with proficient use of 3D virtual models.

3.1 Following a presentation, each educator will download and open the Augment app in Google Play or App Store.

3.2 Following a presentation, each educator will take a picture of an item in class to display in 3D mode.

3.3 Following a presentation and hands-on group activities, each educator will identify items that students can make into 3D models in order to enhance a curriculum based project.

3.4 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a 3D model requirement made in Augment.

3.5 Following creation of a lesson plan incorporating a 3D model requirement made in Augment, each educator will present their lesson plan to peers for small group evaluation.

3.6 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

Goal 4: Educators will be able to access and create lessons with proficient use of Google Street View.

4.1 Following a presentation, each educator will successfully download and open Google Street View app on a device.

4.2 Following a presentation, each educator will access and open a photo on Google Street View.

4.3 Following a presentation, each educator will navigate photos using the screen and the compass.

4.4 Following a presentation, each educator will zoom in and out of pictures.

4.5 Following a presentation and hands-on group activities, each educator will identify a Google Street View photo that can be used in their grade level curriculum.

4.6 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a Google Street View photo.

4.7 Following creation of a lesson plan incorporating a Google Street View photo, each educator will present their lesson plan to peers for small group evaluation.

4.8 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

I-C. Needs Assessment

As our project provides face-to-face instruction for 6th to 12th grade educators who are interested in implementing VR to enhance learning environments, we have decided to assess the needs of a variety of stakeholders. As indicated in the following table, our primary instruments involve an educator survey, interviews with key school personnel, and a student focus group:

	Stakeholders	Expectations for Project Purpose, Goals & Results
Stakeholders & Expectations	6th to 12th Grade Educators	Enhancement of the classroom learning environment; improved content delivery; student engagement
	6th to 12th Grade Students	Motivation to learn; ability to learn via real world contexts;improved information delivery; increased engagement
	School Administrators/School Board Members	Training and enabling teachers to provide innovative use of technology in the classroom in order to advance student ability to succeed in an increasingly technological world; ROI for travel budgets
	School IT Support Personnel	Efficient implementation and ongoing support of forefront VR product initiatives
	School Counselors and Special Education Teachers	Improved content access for students with special learning and behavioral needs
	Parents/PTA Members	Providing students with real world access to content that may otherwise be unattainable or too costly; global networking opportunities for students

	Associated Educators	Gained familiarity by association for educators not directly involved in VR training through educators who implement VR
	Project Roles	**Project Responsibilities**
Project Roles & Responsibilities	Project Manager	Instructional team leader, development of goals, task analysis, learner analysis, development of training materials
	Instructional Team	Development of learning objectives, instructional content, needs assessment and instruments, learner analysis, contextual analysis, procedural analysis, implementation plan
	Facilitators	Instructional content delivery
	SMEs	Needs assessment interviewees and ongoing consultation
	Testers	Instructional content piloting
	Evaluators	Formative and summative evaluation

	Individual Asked	**Perceived Problem**	**Causes/ Indicators**	**Suggested Solution(s)**
Hypothesized Perceived Problem, Causes/ Indicators & Solution	6th to 12th Grade Educators	Technology exists for VR content delivery but materials and training have not been made	● Lack of skills/ knowledge ● Flawed environment ● Lack of motivation ● Flawed incentive	Provide resources such as instructional materials and/or Google Cardboard and

		available to educators; some educators are not interested in using VR content delivery		knowledge in the form of teacher training.
	6th to 12th Grade Students	VR content delivery is possible but educators still rely primarily on print books and audio/video for content delivery.	● Lack of skills/ knowledge ● Flawed environment	Provide resources such as instructional materials and/or Google Cardboard and knowledge in the form of teacher training.
	Special Education Teachers	Alternate methods for constructional content delivery are needed to engage students with special behavioral or learning needs.	● Lack of skills/ knowledge ● Lack of motivation ● Flawed environment	Provide resources such as instructional materials and/or Google Cardboard and knowledge in the form of teacher training.
	School Counselors	For a variety of reasons, it is not feasible for all students to partake in field trips/school outings and alternatives are needed.	● Lack of skills/ knowledge ● Flawed environment	Provide resources such as instructional materials and/or Google Cardboard and knowledge in the form of teacher training.
	Parents/ Community Members	Students are not currently keeping pace with advancement in	● Lack of skills/ knowledge ● Flawed environment	Conduct fundraisers and/or solicit community

		VR technology and ongoing initiatives to incorporate new technology in the classroom are necessary. Parents cannot afford to purchase technology with their own money.		business donations to raise money for VR equipment. Lobby school board to allocate funds for additional technology or technology upgrade.
	IT Support Personnel	Much of the technology for virtual learning is already available to teachers but they do not use it even though IT provides support.	● Lack of skills/ knowledge ● Lack of motivation ● Flawed incentive ● Flawed environment	Provide training for teachers and IT support personnel so that existing freely available VR technology (i.e. Google Street View) will be utilized more frequently by teachers for instructional content delivery.
	Resulting Needs	**Instructional or Non-Instructional?**	**Solution Alternatives**	
Needs & Alternative Solutions	VR Teacher Training	Instructional	IT Support Personnel and/or school librarians could deliver VR instructional content to students based on content interests identified in consultation with the school board, parents, and teachers.	

	Accessible instructional content delivery for special needs students	Instructional	Other alternative instructional delivery methods could be utilized, such as manipulatives, scaffolding, or Text to Speech Readers (TTS Readers)
	Funding	Non-Instructional	PTA fundraiser to raise money for VR equipment (i.e. Google Cardboard)
	Incentives	Non-Instructional	Develop a recognition and incentive program for teachers who make novel and creative use of technology to enhance the classroom environment.
	Constraints		**Constraints**
Constraints	Parent/community cultural beliefs that "screen time" should not replace "real world" experience		Lack of adequate funding
	Lack of basic IT support and equipment in less affluent school districts		Lack of student interest
	Lack of reliable Internet connectivity in rural school districts		Need for fairness in equipping all classrooms with equal technology and all teachers with similar training.
	Human Resources		**Non-Human Resources**
Resources for Design/ Development	Project Manager		School district Internet policies
	Instructional Team		School district technology policies
	SMEs		Desktop computers and/or mobile devices (Chromebooks, tablets, smart phones)
	Testers		School district servers

	Evaluators	Google Classroom, Google Drive, Google Docs, Google Street View, Google Expeditions, Google Cardboard
	Human Resources	**Non-Human Resources**
Resources for Implementation	IT Support Personnel	Desktop/laptop computers and mobile devices (Chromebooks, tablets, smart phones)
	Project Manager	Google Classroom, Google Drive, Google Docs, Google Street View, Google Expeditions, Google Cardboard
	Instructional Team	Face-to-face meeting space for instructional materials presentation; Internet connectivity (Wi-Fi)
	Facilitators	Instructional materials
	People to Ask, Things to Observe/Study (TYPE OF INFORMATION SOUGHT)	**People to Ask, Things to Observe/Study**
Analysis Methods	6th to 12th Grade Educators (ACTUALS/FEELINGS/CAUSES)	● How do you currently use technology in your learning environment? ● Do you currently make use of any VR methods to deliver instructional content to engage learners or enhance their learning environment? ● Observe primary current instructional content delivery methods and teaching approaches. ● Do you believe there are specific reasons to use or not use VR for content delivery in your learning environment? ● Do you believe that real world activities, such as field trips, enhance learning experiences?

		• Are you motivated to adopt VR instructional content delivery in your learning environment?
	6th to 12th Grade Students (ACTUALS/FEELINGS/OPTIMALS)	• Do you prefer learning from books, videos, audios, or by doing real world activities? • Do you mainly learn information in your classroom by reading, watching videos, listening, collaborating with others, or doing activities? • How do you feel about using VR to learn? • Do you already use VR for entertainment? (i.e. game play) • Do you think your school makes effective use of technology? • How could your school make better use of technology, specifically VR technology to learn? • Would you be more motivated to learn through VR lessons than traditional lesson delivery? • What subject do you think would be best suited for VR learning experiences? • What would the ideal VR learning experience be like? • Can you think of any problems with using VR as a learning tool?
	School Administrators/School Board Members (FEELINGS/CAUSES/OPTIMALS)	• Do you believe that the current school budget dedicates an adequate percentage of funding for teacher training and development? Updates to technology equipment? IT support? • Study school district's most recent annual budget report • How do you envision the use of VR to deliver instructional content in your schools?
	School IT Support Personnel (ACTUALS/OPTIMALS)	• Study district technology policies • Study district Internet policies

		● Observe school's current daily use of technology ● What technology skills related to VR instructional content delivery do educators at your school already possess? ● Do you feel confident in your ability to support educators at your school if VR content delivery is regularly implemented? ● Is technology equipment and Internet access in your district well-maintained and able to support VR content delivery? ● How do you ideally envision your role in the implementation of VR instructional content delivery?
	School Counselors (ACTUALS/CAUSES/OPTIMALS/ FEELINGS)	● Do you believe that VR enhanced learning experiences can better prepare students for real world opportunities? ● Could you describe the ways that forefront technology currently benefits students in your school? ● Is current instructional content delivery motivating for students?
	School Special Education Teachers (CAUSES/OPTIMALS/FEELINGS)	● Why is educator training for VR instructional content delivery important for special needs students? ● Are you motivated to adopt VR instructional content delivery in your learning environment? ● How do you envision VR instructional content delivery benefitting students with special needs?
	Parents/PTA Members/Community (FEELINGS)	● Do parents and community members value use of forefront technology such as VR instructional delivery?
	Needs →	**→ Goals**

Translating Needs into Goals	● Educators need the knowledge of VR potentialities in order to incorporate VR instructional content delivery in their learning environments.	● To inform educators of the potential uses of VR to enhance learning environments.
	● Educators need the knowledge and skills to create instructional content for VR delivery.	● To provide instruction to educators on developing VR content to implement in their learning environments.
	● Educators need feedback and evaluation to improve on their initial VR instructional content development efforts.	● To collaborate through peer review to obtain feedback and evaluation necessary for continued improvement.
	● All students need forefront technology to motivate their learning efforts.	● To use VR instructional content delivery to improve the motivation of all students.
	● Special needs students require forefront technology as an alternative to traditional instructional content delivery to improve accessibility.	● To use VR to improve accessibility for students with special needs.
	● Students need educational opportunities that will better prepare them for real world work contexts and opportunity.	● To foster long term transfer of VR capabilities for students from educational contexts to real world contexts and career contexts.
	● Students need to avail themselves of learning opportunities through technology that will help them to think, communicate, and collaborate with globally informed perspectives.	● To encourage shared global VR experience, communication, and collaboration amongst students across geographic space.

As VR technology for use is relatively new for educational purposes, it will be important to assess the educator's environment to determine whether previous new technology has been successfully implemented. Needs Assessment will

involve gauging the existing technology infrastructure, IT support, and community support to ensure successful implementation after training. Phone interviews will take place with school board members, principals, educators, special education teachers, school counselors, IT support staff, parents, and community members to assess actuals, optimals, feelings, and causes.

Educators and administrators will also partake in a twenty question survey to assess educator and administrator feelings, as well as determine optimals and actuals. Additionally, students will be consulted in a focus group format of fifteen to twenty-five students. These focus groups will discuss ideas for how VR could deliver content in a way that is motivating and useful to them. This well-rounded approach makes use of a variety of instruments which will identify causes that may have prevented successful implementation of new technology in the past. Such causes may then be resolved prior to educators developing their own VR lessons, including attainment of resources, support, optimal subject matter, motivation, incentives, and district policies and procedures. Interview questions regarding knowledge and skills should also provide the instructional team with a good basis for understanding prerequisite knowledge needs of the educators.

Please refer to Appendix A.1 to review the Needs Assessment Educator and Administrator Survey (A.1.1), Needs Analysis School Personnel Interview Protocol (A.1.2), and Needs Analysis Student Focus Group Protocol (A.1.3).

I-D. Task Analysis

Prerequisite Analysis

A pre-training survey will be administered to participants to determine equipment needs for school. Workshop is designed for learners who have access to Google Cardboard Kit. VR in the Classroom provides use of kit for workshop. See Appendix A.2 for specification details.

Topic Analysis

Goal 1: Educators will be able to access and create virtual field trip lessons with proficient use of Google Expeditions.

> **1.1** Following a presentation, each educator will download and open the Google Expeditions app on a device.
>> **1.1.1** Introduction to Google Expeditions.

1.1.2 Educators will learn how to select Wi-Fi network for use.

1.1.3 Educators will download and install Google Expeditions onto device.

1.1.4 Educators will open Google Expeditions on device.

1.2 Following a presentation, each educator will check their Wi-Fi connection on their device.

1.2.1 Educators will check Wi-Fi under settings.

1.2.2 Educators will check to see if Wi-Fi is turned to on position.

1.3 Following a presentation, each educator will place their device in Google Cardboard to view Google Expeditions in VR demo mode.

1.3.1 Educators will learn how to navigate demonstration menu.

1.4 Following a presentation, each educator will join an Expedition that is already in progress.

1.4.1 Educators will learn how to open the Expeditions app and follow an Expedition.

1.5 Following a presentation, each educator will identify themselves as the guide role in the Expedition.

1.5.1 Educators will learn how to select Lead to guide Expedition.

1.6 Following a presentation, each educator will search, select, and download a Google Expedition field trip to lead.

1.6.1 Educators will learn how to connect Explorers to selected Expedition.

1.6.2 Educators will learn how to review how to troubleshoot connection issues.

1.7 Following a presentation, each educator will start a Scene and navigate between scenes.

1.7.1 Educators will learn how to pick a scene in Expeditions app.

1.7.2 Educators will view notes and questions.

1.8 Following a presentation, each educator will freeze the screen and focus on a location.

1.8.1 Educators will learn how to view Google points of interest.
1.8.2 Educators will learn how to create own points of interest.
1.8.3 Educators will learn how to pause and explore a scene.

1.9 Following a presentation, each educator will end an Expedition.

1.9.1 Educators will learn how to end Expedition.
1.9.2 Educators will learn clean up and care of equipment.

1.10 Following a presentation and hands-on group activities, each educator will identify a Google Expedition that can be used in their grade level curriculum.

1.10.1 Each educator will review state and local standards and Grade Level Expectations as they identify a specific Google Expedition.

1.11 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a Google Expeditions Field Trip.

1.11.1 Educators will be presented with Virtual Reality Lesson Plan template.
1.11.2 Educators will learn how to create a lesson plan incorporating Google Expeditions.

1.12 Following creation of a lesson plan incorporating a Google Expeditions field trip, each educator will present their lesson plan to peers for small group lesson plan peer review.

1.12.1 Educators will learn to electronically share their Google Doc lesson plan with members of their assigned small group for peer review.

1.13 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

1.13.1 Time-permitting, educators will have the option of refining lesson plans.

Goal 2: Educators will be able to access and create lessons with proficient use of NY Times virtual reality videos and stories.

2.1 Following a presentation, each educator will download and open the

New York Times VR app on a device.

2.1.1 Introduction to 360° virtual reality videos and stories.

2.1.2 Educators will learn to download and install New York Times VR onto device.

2.2 Following a presentation, each educator will access 360° videos and stories through New York Times VR.

2.2.1 Educators will learn how to select Wi-Fi network for use.

2.2.2 Educators will learn how to navigate New York Times VR.

2.3 Following a presentation, each educator will place their device in Google Cardboard to view New York Times VR in VR mode.

2.3.1 Educators will learn how to place device in the cardboard.

2.3.2 Educators will learn how to begin a New York Times VR story.

2.4 Following a presentation and hands-on group activities, each educator will identify a 360° video or story that can be used in their grade level curriculum.

2.4.1 Each educator will review state and local standards and Grade Level Expectations as they identify a specific Google Expedition.

2.5 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a 360° virtual reality video or story experience.

2.5.1 Educators will be presented with Virtual Reality Lesson Plan template.

2.5.2 Educators will learn how to create a lesson plan incorporating Google Expeditions.

2.6 Following creation of a lesson plan incorporating a 360° virtual reality video or story experience, each educator will present their lesson plan to peers for small group evaluation.

2.6.1 Educators will electronically share their Google Doc lesson plan with members of their assigned small group for lesson plan peer review.

2.7 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

2.7.1 Time-permitting, educators will have the option of refining lesson plans.

Procedural Analysis:

Learning Goals and Objectives have been detailed in step-by-step procedural analysis. The observable and measurable goals for each application are included in Appendix A.2.

II. Evidence of Acceptable Results

II-A. Formative Evaluation

In order to effectively work with educators during the planned professional development training on using VR products and apps in the classroom, the presenters of the instructor training sessions will complete ongoing formative assessments. This will enable the instructors to meet the immediate needs of the educators and to make sure the content being covered is useful and appropriate. The formative assessments will be conducted through questions and three separate approaches.

Content Organization Key Questions:
1. Are the goals appropriate to introduce and expose educators to VR engagement and use in the classroom?
2. Are the VR demonstrations aligned with learning objectives?

Workshop Organization Key Questions:
1. Are the VR learning sessions engaging and varied?
2. Are the practice sessions beneficial in experiencing VR?
3. Are the workshop sessions paced appropriately?
4. Did the use of the VR activities appropriately prepare the educators to actively teach and engage students in VR experiences in the classroom?

Workshop Value Key Questions:
1. Did the instructors feel they gained new and unique knowledge from the VR experiences and apps?
2. Are the workshop goals valuable for classroom experiences?
3. Are the VR experiences and apps transferable to the classroom?

4. Did the instructors feel they gained new and unique knowledge from the VR experiences and apps?

Approach 1: Interview with an Instructional Design Expert

In order to design an effective and engaging workshop using VR, an Instructional Design Expert would be instrumental in guiding the professional development opportunity. Expert feedback would be crucial in designing an effective and engaging workshop that would be useful to educators. Connecting with an Instructional Design Expert not only allows for expert advice, it also allows for impartial and open-minded feedback. Since this workshop is designed to teach educators how to implement VR in the classroom, a design expert with a technology background would be interviewed. This expert would first be consulted after reviewing the workshop design, course schedule, and teaching materials. A subsequent interview would take place after the expert had an opportunity to observe some of the workshop in progress. (See [Appendix A.3.1](#))

Approach 2: Electronic Survey of Workshop Participants

At the end of day two of the workshop, each participant will be given a survey to complete regarding their learning experience. The survey is intended to provide immediate feedback of the workshop content, organization, and value. The data collected would allow for the instructors of the workshop to implement improvements for future participants. (See [Appendix A.3.2](#))

Appendices A.3.1, A.3.2, A.3.3.

A.3.1: Interview of Instructional Design Expert
(Link to [Appendix A.3.1 Interview Questions](#))

A.3.2: VR in the Classroom: Formative Survey Google Form
(Google Form Link: [VR in the Classroom: Formative Survey](#))

A.3.3. VR in the Classroom: Event Registration
(Google Form Link: [Event Registration](#))

II-B. Summative Evaluation

Summative evaluations will be completed six months following the completion of the VR in the Classroom workshop training in order to evaluate the effectiveness and impact of the instructional system. This evaluation will aim to determine whether the goals and objectives of the instructional system were met and have

truly impacted the participant educator. Feedback from the educator will be attained through survey, questionnaire, and classroom observation instruments. The following are key questions we seek to answer through the Summative Evaluation:

Key Questions:

1. Do the educators have a broader understanding of using VR in the classroom?
2. Do the educators have access to the needed technology for using VR in the classroom?
3. Did the educators have access to funds to purchase equipment needed to implement and manage programs related to VR in the Classroom?
4. Are the educators able to access and create virtual field trip lessons with proficient use of Google Expeditions?
5. Are the educators able to access and create lessons with proficient use of NY Times VR videos and stories?
6. Are the educators able to access and create lessons with proficient use of 3D virtual models?
7. Are the educators able to access and create lessons with proficient use of Google Street View?
8. Do the educators feel confident with their ability to access and create lessons utilizing VR in the Classroom?
9. How are the educators using VR in the Classroom for collaboration with colleagues?
10. What additional applications are educators utilizing to enhance or supplement the VR experience that were not covered in the workshop training?
11. Are there any applications or programs that should be added to the workshop training?
12. Have the educators observed students engage in active learning since implementing VR in the Classroom?

Approach 1: Instructor Implementation Survey and VR Training Follow-up Questionnaire

Six months after the conclusion of the VR training, all instructors will be asked to complete a brief Google Form survey to identify educators who did not successfully implement a VR lesson in their classroom within the first six months of training.

Educators who self-identify as <u>not</u> having successfully implemented a VR lesson in their classroom in the first six months will then be asked to complete a more comprehensive follow-up Google Form questionnaire to identify root causes for lack of successful implementation. The follow-up questionnaire will obtain quantitative data through Likert Scale questions to gauge educators' retrospective feelings about the practical application of their training experience, as well as acquire robust qualitative data through several open-ended questions on factors that may influence an educator's ability to successfully implement a VR lesson in the classroom. (See Appendix A.4.1)

Approach 2: Instructor Implementation Survey and Classroom Participant Observations

Six months after the conclusion of the VR training, all instructors will be asked to complete a brief Google Survey to identify educators who successfully implemented a VR field trip lesson in their classroom within the first six months of training. Educators who self-identify as having successfully implemented a VR lesson in their classroom will then be contacted through a random selection process with a request for an observational classroom visit by a member of the instructional team during their delivery of a VR lesson. The instructional team member will request an advance copy of the lesson plan, along with all supplemental lesson materials, so that they may better focus on observing the learning activity and the educator's delivery of instructional material. Qualitative observational data of optimal and actual performance of both educator and learners will then be recorded. (See Appendix A.4.2)

Appendices A.4.1, A.4.2, and A.4.3

A.4.1: VR in the Classroom: Summative Survey Google Form
(Google Form Link: Summative Survey)

A.4.2: VR in the Classroom: Follow-up Questionnaire Google Form
(Google Form Link: Follow-up Questionnaire)

A.4.3: Implementation Rating and Observation Form (Link to Appendix A.4.3)
(Based on Kirkpatrick's Four Level Evaluation Model)

III. Learning Experiences and Instruction

The VR in the Classroom workshop will focus on 6th-12th grade educators and will be an in person hands on training. The Learner and Contextual Analysis will determine and identify barriers in the instruction that may impact the workshop.

The information gathered will guide the design and implementation of the workshop to meet their needs and successfully implement program goals.

The program will include a variety of training items so that educators can successfully implement VR in the classroom. Aside from the demonstration the workshop will include sample lesson plans, Google Expeditions training cards, website referrals, and specifications for VR in the classroom.

III-A. Learner Analysis

	Learner Factors	**Data Collection for Information**
Orienting Context	**Demographics** 1. What is the average age of participants? 2. What is the gender makeup of the participants? 3. Where are the participants from? 4. What grades being taught have the highest and lowest frequency among participants? **Background** 5. What are the different subjects taught? 6. How many years of teaching experience do the participants have? **Technology Experience** 7. Do the educators have any previous training in technology applications? 8. How comfortable are the educators with using technology in their classroom? 9. Do the educators currently embed technology into their lesson plans?	**Data Collection Method:** ● Needs Analysis Educator Survey ● Registration Questionnaire ● Pre-Workshop Questionnaire

	10. What kind of applications do their students use on a regular basis? 11. How comfortable is the educator with investigating new technology resources to implement into their lesson planning? **Attitudes** 12. What is the overall attitude of the educator towards using technology with the students? 13. How likely are the educators to implement the VR technology into the classroom? 14. What motivated the educators to take the VR workshop? 15. How do the educators expect to benefit from VR in the Classroom training? 16. What do the educators expect to be able to do at the end of the workshop training?	

Instructional Context	1. What methods of instruction do the participants prefer?
	2. If given a preference on learning method, would possible participants choose?
	   a. Learn by Reading
	   b. Learn by Listening
	   c. Learn by observing
	   d. Learn by doing
	
	3. Do the participants prefer:
	   a. Lecture
	   b. Group work
	   c. A combination of lecture and group work.
		Data Collection Method:
		
		● Expert Survey
		
		● Registration Questionnaire
		
		● Pre-Workshop Questionnaire

	4. Do the participants prefer receiving feedback from:
	    a. Instructors
	    b. Peers
	    c. Instructors and Peers	

Transfer Context	1. Do the participants feel prepared to utilize VR in their classroom?
	2. If the participant does not feel prepared, what aspects of VR does the participant feel are still troublesome or difficult?
	3. What are the participant's concerns about using VR in their classroom?
	4. When does the participant plan on implementing VR into the classroom?
	    a. Immediately
	    b. Within thirty days
	    c. WIthin sixty days
	    d. Within ninety days
	    e. Within six months
	    f. Next school year
	    g. Within five years
	    h. Never
	5. What would the participant want for continuing education and support? (Circle as many as you would like.)
	    a. Further instruction
	    b. A telephone help line
	    c. An e-mail help line
	    d. Updates on new technology
	    e. In classroom demonstrations and instruction
	6. Is the participant willing to try to overcome future obstacles in order to implement VR learning into their classroom?
	    a. Rate on a scale 1 to 10, 10 being extremely willing.
	    b. Explain the reasoning for the ranking.
		Data Collection Method:
		
		● Summative Survey
		
		● Follow-up Questionnaire

III-B. Contextual Analysis

Contextual Analysis was completed for the educators who will be participating in the VR in the Classroom workshop training. The analysis is organized by orienting, instructional, and transfer contexts. Immediate environmental and organizational factors are examined by an array of data collection tools.

Orienting Context	Data Collection for Information
Immediate Environmental Factors 1. Will participants have access to necessary equipment (i.e. Chromebooks) to complete the training? 2. Will reliable Wi-Fi access be available to support all the devices used by the instructors and participants? 3. Is there a sufficient space available in which the instruction will occur?	**Data Collection Method:** ● Needs Analysis Educator Survey ● Pre-Workshop Questionnaire ● Facilities Research and Observational Visit
Organizational Factors 1. What is the district-allotted budget for the training? 2. Will there be adequate IT staff present to provide technology support during the training? 3. What kind of incentive will faculty receive for participating in the training?	**Data Collection Method:** ● School Budget Analysis ● Needs Analysis Educator Survey ● Needs Analysis School Personnel Interview Protocol
Instructional Context	**Data Collection for Information**
Immediate Environmental Factors: 1. Will educators have adequate prerequisite technology backgrounds to follow instructions in a timely manner? 2. Will facilitator be able to adequately troubleshoot and assist all educators? 3. Will optimal learner grouping for peer review collaboration be self chosen or be determined by the instructors based on Pre-Workshop Questionnaire?	**Data Collection Method:** ● Pilot of Instructional System with Volunteer Educators Prior to System Launch ● Pre-Workshop Questionnaire

Organizational Factors	Data Collection Method:
1. Are participants given additional VR Online resources to which they can refer after the training? 2. Will the district provide continual professional development to participants in the use of VR in the classroom?	• Needs Analysis School Personnel Interview Protocol • Exit Survey
Transfer Context	**Data Collection for Information**
Immediate Environmental Factors: 1. Will participants be provided with sufficient curriculum and GLE materials in order to align lesson plans with appropriate standards? 2. Will there be sufficient time given to participants to practice and implement what they have learned from the trainings?	**Data Collection Method:** • Pilot of Instructional System with Volunteer Educators Prior to System Launch • VR in the Classroom: Formative Survey
Organizational Factors: 1. Will the district provide educators with sufficient IT support to implement their learning in the classroom? 2. Will educators have sufficient financial support from the PTA group and/or school board to purchase necessary equipment to implement VR in their classroom? 3. Will the educator's district provide any recognition for teachers who make the effort to implement VR technology in their classroom? 4. Will educators have the opportunity to share their VR knowledge through collaboration with other educators post workshop training?	**Data Collection Method:** • Needs Analysis School Personnel Interview Protocol • Pre-Workshop Questionnaire • VR in the Classroom: Summative Survey • VR in the Classroom: Follow-up Questionnaire

Data collection tools for this project entails a variety of qualitative and quantitative methods involving thirteen specific instruments. Each instrument will be deployed before, during, and after the project to provide information for the contextual analysis as follows:

Instrument	Title	System Stage of Instrument	Instrument Questions/Statements Relevant to Contextual Analysis
Instrument 1/ Needs Analysis	Needs Analysis Educator Survey	Initiation	• Professional development opportunities include practice for applying new technology. (0-4) • Professional development opportunities include peer review feedback for application of new technology. (0-4) • Adequate funding is devoted to support successful adaptation of new technology tools. (0-4) • Adequate funding is in place to support sufficient teacher training for new technology tools. (0-4) • School IT personnel provides sufficient support during an initiation phase of new technology. (0-4) • Intrinsic and extrinsic motivators provide a reason to adapt new technology to enhance learning environments. (0-4)
Instrument 2/ Needs Analysis	Needs Analysis School Personnel Interview Protocol	Initiation	• Do you believe that the current school budget dedicates an adequate percentage of funding for teacher training and development? Updates to technology equipment? IT support? • In what way are you encouraged to initiate efforts to implement new technology through content delivery or other means? • What kind of recognition should there be for instructor led initiatives to implement VR instructional content delivery?
Instrument 3/ Needs Analysis	Needs Analysis Focus Group Protocol	Initiation	• Do you think your school makes good use of technology now? • How could your school make better use of technology, specifically VR technology to learn?
Instrument 4/	Registration Questionnaire with	Pre-Instructional	• How many years of teaching experience do the participants have?

Learner Analysis	Demographic Information		
Instrument 5/ Learner Analysis	Pre-Workshop Questionnaire	Pre-Instructional	● Do the educators have any previous training in technology applications?
Instrument 6/ Learner Analysis	Expert Survey	Initiation/ Pre-Instructional and Ongoing	● What methods of instruction do the participants prefer?
Instrument 7/ Formative Evaluation	VR in the Classroom: Formative Survey	Instructional	● Are the virtual reality experiences and apps appropriate for the individual educator's grade level?
Instrument 8/ Formative Evaluation	Lesson Plan Peer Evaluation	Instructional	● The lesson plan is appropriately aligned with and identifies specific grade level expectations (GLEs) and subject curriculum. (YES/NO)
Instrument 9/ Formative Evaluation	Exit Survey	Conclusion	● What would the participant want for continuing education and support?
Instrument 10/ Formative Evaluation	ID Expert Survey: Interview Dialogue and Questions for Instructional Design	Conclusion	● Is the timeline of the workshop appropriate?
Instrument 11/ Summative Evaluation	VR in the Classroom: Summative Survey	Post-Instructional	● Are you using VR in the classroom to collaborate with other educators?
Instrument 12/ Summative Evaluation	VR in the Classroom: Follow-up Questionnaire	Post-Instructional	● I had access to all the VR equipment needed to perform the goals presented in the workshop. (1-5) ● I had the district support I needed to implement VR in the classroom. (1-5)
Instrument 13/	Implementation Rating and	Post-Instructional	● Was the learning transferred to the class?

Summative Evaluation	Observation Form		● Requests assistance or clarification from district IT support as needed. (E/G/C)

These instruments will be used as the basis for contextual analysis. Formative and summative instruments will be deployed during and after the instructional stage, however the information gained from these instruments will be useful in iterative efforts toward ongoing and continuous improvement to the instructional system.

The following assumptions are made for the design of the learning experience based on the Learner and Contextual Analysis: Educators are presumed to be teachers who represent a wide-variety of grade level subject expertise at the grade 6 through grade 12 level and are well versed in their curriculum and grade level expectations (GLEs). Educators will be familiar with basic computer and word processing skills, including turning on a computer, using keyboard and mouse functions, accessing location specific Wi-Fi, and accessing Google Docs and Google Forms. Similarly, it is expected that educators are familiar with the use of mobile devices and will have access to their own Google Cardboard Kits. It is assumed that educators will have a school-associated Google account. Educators will have the ability to visit websites and download apps to a device. It is assumed that educators are motivated to embrace the potential for new VR technology and plan to apply such technology in their own classrooms.

The training location is assumed to be capable of providing reliable Internet, Wi-Fi, and power. Sufficient technology (i.e. sound systems, microphones, projection screen) will be available in the training location to support all needed presentation materials. Adequate seating for educators and optimal light conditions for displaying moving images on computer screens and VR viewers are also assumed. The facility and training space must be accessible for educators with special mobility needs.

III-C. Types of Learning Experiences and/or Instruction

The entire learning experience will be presented in a two-day professional development training session. The design of the training will be broken down into four components on the first day. Each component will be presented in a similar format. First, the new information about the VR app or experience will be presented, giving each participant necessary background knowledge. Second, the

instructor will demonstrate how to use that particular VR app or experience. Third, the instructor will guide the participants through hands-on activities using the VR apps and tools. Finally, the participants will be given time to independently practice the VR app.

The second day will include break-out sessions with small groups working together to identify specific content areas where VR experiences can be embedded into lesson plans. Lesson plans will be developed individually and then presented to the small group for peer feedback and input. The participants should exit the two-day training session with lesson plans that can be implemented into their classroom using the four different training components.

See Appendix B.1 for the Table of Learning Experiences and Instructional Strategies.

III-D. Materials for Training Workshop

Sample materials for Google Expeditions have been created for workshop. Materials include Google Expeditions training cards (lesson plans ideas), sample lesson plan form, lesson plan peer evaluation and sample session slide-show presentation.

See Appendix B.2 for instructional artifacts.

III-E. Implementation Plan

The workshop will be presented in a two-day professional development training session for educators who are new to using virtual reality in the classroom.
Pre-workshop Requirements
- Identify demographics and goals of educators by completing pre-instructional survey as well as a needs analysis survey
- The training team will conduct needs assessment, task analysis, learner analysis, and contextual analysis
- The training team will work with district to identify and reserve appropriate space and equipment
- The training team will also conduct a trial run of the entire workshop

Post-workshop Requirements
- Summative evaluation

- Follow-up questionnaire
- In person observation

Logistical Requirements

- Computers / Chromebooks with Wi-Fi / Internet connectivity and proper bandwidth to support multiple stations
- Google accounts for all participants
- Access to Google Apps for each participant and instructor
- Instructor station with internet connectivity, projector/ SMART Board, and tablet from Expeditions Kit
- Google Cardboard from Expeditions Kit for each participant
- Cords to connect the instructor's computer to the SMART Board

Google Drive access for paperless materials

- Sample VR lesson plan
- District curriculum available to all participants
- Google Documents that include the presentation and instructions shared with each participant
- Google Expeditions material for each participant and instructor
- NY Times VR story materials for each participant and instructor
- 3D models materials for each participant and instructor
- Google Street View material for each participant and instructor

See Appendix B.3.1 for Implementation Schedule and Appendix B.3.2 for Quick Start Guides

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V. Appendices

APPENDIX A: Needs Assessment Instruments and Evaluation Materials

A.1 Needs Assessment Materials

Needs Analysis Educator and Administrator Survey

Instructions: Please reflect on each given statement and provide a 0-4 ranking. Carefully consider the **optimal** situation ("What Should Happen? Whether or not it is occurring in your organization, does this practice …"), then rate each statement as follows: 1 = Negatively impact performance, 2 = Have no effect on performance, 3 = Have some positive impact on performance, or 4 = Have a very positive impact on performance. Next, separately consider the **actual** situation ("What Actually Happens" Does it occur in your organization?) for each given statement, then also rate each statement as follows: 1 = Strongly disagree, 2 = Disagree, 3 = Agree, or 4 = Strongly agree. You may answer 0 for ANY statement for which you do not know an answer.

PRACTICE or BEHAVIOR	WHAT *SHOULD* HAPPEN? Whether or not it is occurring in your organization, does this practice … 1 = Negatively impacts performance 2 = Have no effect on performance 3 = Have some positive i impact on performance 4 = Have a very positive impact on performance 0 = Don't know how it impacts performance	WHAT *ACTUALLY* HAPPENS? Does it occur in your organization? 1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree 0 = Don't know if it occurs in our organization
1. We regularly engage learners with new technology tools for learning.		
2. We motivate our learners by the use of new technology to enhance the learning environment.		

3. We regularly solicit and consider new ideas and methods to utilize new technology.		
4. We creatively use new technology tools to enhance the learning environment.		
5. We consider the positive and negative impacts of adopting new technology for learners with special needs.		
6. Parents and PTA encourage new technology in our learning environments.		
7. Our administrators and school board support efforts to include new technology tools in our learning environments.		
8. We have identified key aspects of our community culture in regard to community support for adaptation of new technology.		
9. We welcome the potential for virtual reality to enhance our classroom learning environment.		
10. We currently deliver existing course content through traditional means that may be better-served by virtual reality delivery.		
11. We recognize the logistical challenges of new technology both within our school and within the homes of our learners.		
12. Adequate training is provided for new adaptation technology.		
13. Professional development opportunities include practice for applying new technology.		
14. Professional development opportunities include peer review feedback for application of new technology.		
15. We maintain a good working knowledge of applications of new technology tools as they are brought to market.		

16. Adequate funding is devoted to support successful adaptation of new technology tools.		
17. Adequate funding is in place to support sufficient teacher training for new technology tools.		
18. School IT personnel provides sufficient support during an initiation phase of new technology.		
19. Intrinsic and extrinsic motivators provide a reason to adapt new technology to enhance learning environments.		
20. Learners and their families are well-supported by school IT personnel during an initiation phase of new technology.		

* This survey template is based on recommendations and information in: Pfeffer, J., & Sutton, R.I. (2000). *The knowing–doing gap: How smart companies turn knowledge into action*. Boston: Harvard Business Press.

Thank you for your participation!

A.1.2 Needs Analysis School Personnel Interview Protocol

School Personnel: Interview Protocol

Date: _____ Method/Location: _____   Phone:_____

Interviewee: _____

Interviewer: _____

Interview Start Time: _____ Interview Concluded Time: _____

Goals of the Call:
- To determine if or how virtual reality (VR) instructional content delivery can be used to enhance learning environments in your school district.

About Our Team:
- We are graduate students conducting interview as part of ISLT 9471: Instructional Systems Design course project.

- We are seeking information on utilization of forefront technology, such as VR, to enhance learning environments.

About this Project:

This project involves providing face-to-face instruction over the course of two days for 6th to 12th grade educators who are interested in implementing VR in their classrooms in order to further engage students in learning. Educators will (1) explore various examples of VR field trips, VR news stories, 3D exhibits, and VR experiences with street view, (2) have the opportunity to brainstorm with colleagues to determine current subject matter best suited for this type of teaching/learning method, (3) develop and implement their own plans for a VR learning experience, and (4) have the opportunity for peer reviews of their initial product with additional evaluation from the instructional team.

About this Call:

- We wanted to talk with you because of your knowledge of targeted learning environments, educators, and their students
- Talking to us is voluntary and your responses will be kept confidential
- Our interview will probably take about 60 minutes
- Do you have any questions before we begin?

Vision	What do you think VR instructional content delivery is intending to accomplish? How do you envision the use of VR to deliver instructional content in your schools?
	What do you wish it could accomplish?
Expectations	What is your role in working toward such an accomplishment? What do you believe you would be expected to do? What are you expected to do by your school in regard to implementing new technology?
	How do you ideally envision your role in the implementation of VR instructional content delivery?
	What would you like to be doing?
Feedback	How will you know when you are meeting these expectations?
	What is a good way for you to find out how well you are meeting expectations?

Tools	What resources (SMART boards, computers, mobile devices, Internet, books, tools, headsets, viewers, etc.) do you presently have to help you meet the expectations? How do you use these resources in your current learning environment?
	Which of these tools is most crucial for the skills needed for VR instructional content delivery?
	What other resources might you need?
	Do you believe that the current school budget dedicates an adequate percentage of funding for teacher training and development? Updates to technology equipment? IT support?
	Is technology equipment and Internet access in your district well-maintained and able to support VR content delivery?
Environment	Is your work environment set-up to help you be successful in implementing new technology? How so?
	What barriers to success do you and fellow educators confront in your workplace?
	How could these barriers be overcome?
	Do you believe there are good reasons to use or not use VR for content delivery in your learning environment?

Processes	In terms of implementing new technology are special processes (or systems) in place to help you be successful with implementation? (e.g., process for peer review of feedback or administrator evaluation)
	How do you currently try to implement new technology? Do you currently make use of any VR methods to deliver instructional content to engage learners or enhance their learning environment?
	What kinds of help would you most like to receive? How would you like to receive this help?
Rewards	In what ways would you benefit if VR instructional content delivery implementation efforts were successful?
	Could you describe the ways that forefront technology currently benefits students in your school?
	How do you think the learners would benefit from the success of such efforts?

	Do you believe that VR enhanced learning experiences can better prepare students for real world opportunities?

Recognition	How do others at your school view your efforts to implement new technology? (positive and negative)
Incentives	In what way are you encouraged to initiate efforts to implement new technology through content delivery or other means? What other incentives would lead you to do more?
Motivation	What led to your involvement in teaching through use of technology? Do you want to be involved in efforts to implement new technology, such as VR instructional content delivery? Do you believe that real world activities, such as field trips, enhance learning experiences? Is current instructional content delivery motivating for students? Are you motivated to adopt VR instructional content delivery in your learning environment?

Self-Concept	If your institution was extremely effective in implementing VR instructional content delivery, how would you see yourself in that picture? (Describe what you see.) Do you feel confident in your ability to support educators at your school if VR content delivery is regularly implemented?
Capacity	What things about your work are just tough for you to deal with when dealing with implementation of new technology? (e.g., lack of adequate training, lack of technical support, equipment or Internet failures, etc.) What about specifically in relation to implementing new technology with special needs students? Why is educator training for VR instructional content delivery important for special needs students?
Knowledge/ Skill	What skills do you need to help you be successful in implementing new technology?

	What technology skills related to VR instructional content delivery do educators at your school already possess? What skills are needed by the following people to help you be successful in implementing new technology? ● school board members ● principals/assistant principals ● fellow educators ● students ● IT support staff/others
School/ District Culture	How does your school get people involved in day-to-day tasks and decision making in regard to implementing new technology? ● Does this seem to work OK? How so? How does your school respond to internal and external opportunities and challenges (i.e. disruptions)? ● Does this response usually work? How so? How consistent is your school in terms of how it carries out day-to-day operations in regard to implementing new technology? How consistent is it in terms of working to achieve long-term objectives and addressing major challenges in regard to implementing new technology? ● Do the policies and procedures (formal and informal) used in your school district to implement new technology help achieve long-term stability? How so? Do your school district's culture, its resources, and activities fit together in such a way that the institution accomplishes things that are important in regard to implementing new technology?

Conclusion:
- As a quick summary, what I heard you say is:
- Is there anything we have not discussed that you would like to add?
- Can I contact you to clarify any of this information or if I need to ask any additional questions? Again, your responses will be kept confidential.

A.1.3 Needs Analysis Student Focus Group Protocol

Grade 6 to Grade 12 Students: Focus Group Protocol

Date: _____ Method/Location: _____

Interviewees: _____

Interviewer: _____

Interview Start Time: _____ Interview Concluded Time: _____

Goals of the Focus Group:

- To determine if or how virtual reality (VR) instructional content delivery can be used to enhance learning environments in your school district.

About Our Team:

- We are graduate students conducting interview as part of ISLT 9471: Instructional Systems Design course project.
- We are seeking information on utilization of forefront technology, such as VR, to enhance learning environments.

About this Project:

This project involves providing face-to-face instruction over the course of two days for 6th to 12th grade educators who are interested in implementing VR in their classrooms in order to further engage students in learning. Educators will (1) explore various examples of VR field trips, VR news stories, 3D exhibits, and VR experiences with street view, (2) have the opportunity to brainstorm with colleagues to determine current subject matter best suited for this type of teaching/learning method, (3) develop and implement their own plans for a VR learning experience, and (4) have the opportunity for peer reviews of their initial product with additional evaluation from the instructional team.

About this Focus Group:

- We wanted to talk with you because of your knowledge of grades 6-12 learning environments, technology, and subject matter.
- Talking to us is voluntary and your responses will be kept confidential.
- Our focus group will probably take about 30 minutes.
- Do you have any questions before we begin?

Discussion Questions for Students:

1. Do you prefer learning from books, videos, audios, collaboration, or doing real world activities?

2. Do you mainly learn information in your classroom by reading, watching videos, listening, collaborating with others, or doing activities?
3. How do you feel about using VR to learn?
4. Do you already use VR for entertainment? (i.e. game play)
5. Do you think your school makes good use of technology now?
6. How could your school make better use of technology, specifically VR technology to learn?
7. Would you be more motivated to learn through VR lessons than through traditional lesson delivery methods? (i.e. books, videos)
8. What subject do you think would be best suited for VR learning experiences?
9. What would the ideal VR learning experience be like?
10. Can you think of any problems with using VR to learn?

Conclusion:

- As a quick summary, what I have heard you say is:
- Is there anything we have not discussed that you would like to add?
- Can I contact you to clarify any of this information or if I need to ask any additional questions? Again, your responses will be kept confidential.

A.2 Procedural Analysis Detailed Outline

Goal 1: Educators will be able to access and create virtual field trip lessons with proficient use of Google Expeditions.

1.1 Following a presentation, each educator will download and open the Google Expeditions app on a device.

1.1.1 Go to the Expeditions app in the Google Play Store (Android) or Expeditions app in iTunes Apps Store (Apple).

1.1.2 Tap **Install** to add the app to the device (Android) or Tap **Get** > **Install** (Apple) to add the app to the device.

1.2 Following a presentation, each educator will check their Wi-Fi connection on their device.

1.2.1 Tap **Settings** > **Wi-Fi**.

1.2.2 Make sure **Wi-Fi** is On and that they are connected to a network.

1.3 Following a presentation, each educator will place their device in Google

Cardboard to view Google Expeditions in VR mode.

1.3.1 Open Google Cardboard app and select LAUNCH CARDBOARD DEMOS

1.3.2 Turn device and place in Cardboard.

1.3.3 Search for menu bar. Educators may need to turn chairs or stand to turn.

1.3.4 Tap screen to open Arctic Journey on the far right side of menu bar.

1.3.5 Tap LEARN and use Google Cardboard to explore the scene.

1.4 Following a presentation, each educator will join an Expedition that is already in progress.

1.4.1 Open the **Expeditions** app and tap **Follow**.

1.4.2 Find the Expedition that the guide started, and tap **Follow**.

1.4.3 Place phone in Google Cardboard viewer.

1.4.4 Watch and Listen to Expedition in progress.

1.5 Following a presentation, each educator will identify themselves as the guide role in the Expedition.

1.5.1 Open Expeditions app.

1.5.2 Pick LEAD for guide.

1.6 Following a presentation, each educator will search, select, and download a Google Expeditions field trip to lead.

1.6.1 Using the educator's iPad or laptop, open the **Expeditions** app and tap **Lead**.

1.6.2 Make sure your explorers are connected to your Wi-Fi network.

1.6.3 Check how many explorers are connected by looking at the People symbol at the top.

1.6.4 Tap **Connect Explorers** or People if no explorers are present.

1.6.5 Open a downloaded Expedition or browse to find a new one. You need to be connected to the Internet to download a new Expedition.

1.6.6 Play selected scene.

1.7 Following a presentation, each educator will start a scene and navigate between scenes.

1.7.1 Scroll left and right to pick a scene in the Expedition.
1.7.2 Tap Play (play button).
1.7.3 Swipe bottom of iPad to review the notes, questions, and information for the scene.

1.8 Following a presentation, each educator will freeze the screen and focus on a location.

1.8.1 Select **points of interest**.
1.8.2 Tap on point for explorers to view. Arrows will guide them to the point of interest on their screens.
1.8.3 Tap and hold area on screen to create own **points of interest.**
1.8.4 Tap the icon and remove **points of interest.**
1.8.5 Tap Pause to pause a scene.
1.8.6 Tap and hold a spot in a scene. Explorers will see an arrow directing them to that spot.

1.9 Following a presentation, each educator will end an Expedition.

1.9.1 To quit an Expedition, tap the **X** next to the Expedition title at the top of your screen.

1.10 Following a presentation and hands-on group activities, each educator will identify a Google Expedition that can be used in their grade level curriculum.

1.10.1 Each educator will refer to state/local standards and GLE's as they identify a specific Google Expedition.

1.11 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a Google Expeditions field trip.

1.11.1 Each educator will open a new VR (lesson template).
1.11.2 Each educator will develop a lesson plan using Backwards Design, ADDIE, or other similar design model.

1.12 Following creation of a lesson plan incorporating a Google Expeditions field trip, each educator will present their lesson plan to peers for small group evaluation.

1.12.1 Each educator will electronically share their Google Doc lesson plan with members of their assigned small group.

1.12.2 Each educator will evaluate one person's Google Expeditions field trip lesson plan using a criterion checklist.

1.13 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

1.13.1 Time-permitting, educators will have the option of refining lesson plans.

Goal 2: Educators will be able to access and create lessons with proficient use of NY Times virtual reality videos and stories.

2.1 Following a presentation, each educator will download and open the New York Times VR app on a device.

2.1.1 Go to the New York Times in the Google Play Store (Android) or New York Times in iTunes Apps Store (Apple).

2.1.2 Tap **Install** to add the app to the device. (Android) or Tap **Get** > **Install** (Apple) to add the app to the device.

2.2 Following a presentation, each educator will access 360° videos and stories through New York Times VR.

2.2.1 Check Wi-Fi connection and make sure that Wi-Fi is connected.
2.2.2 Open NYT VR app.
2.2.3 Select NYT VR 360° story to view.
2.2.4 Select stream.
2.2.5 Select Google Cardboard.

2.3 Following a presentation, each educator will place their device in Google Cardboard to view New York Times VR in VR mode.

2.3.1 Turn device sideways and place in cardboard.
2.3.2 360° story will start playing automatically.

2.4 Following a presentation and hands-on group activities, each educator will identify a 360° video or story that can be used in their grade level curriculum.

2.4.1 Refer to state/local standards and grade level expectations (GLEs) to identify a specific New York Times 360° video.

2.5 Following a presentation and hands-on group activities, each educator will create a lesson plan incorporating a 360° virtual reality video or story experience.

> **2.5.1** Open a new Google Doc lesson template.
> **2.5.2** Develop a lesson plan using Backwards Design, ADDIE, or other similar design model.

2.6 Following creation of a lesson plan incorporating a 360° virtual reality video or story experience, each educator will present their lesson plan to peers for small group evaluation.

> **2.6.1** Electronically share their Google Doc lesson plan with members of their assigned small group.
> **2.6.2** Form small groups and evaluate each lesson plan.

2.7 Following presentations and group evaluation, each educator will use peer feedback to revise and refine their lesson plan.

> **2.7.1** Time-permitting, educators will have the option of refining lesson plans.

TASKS: Specifications for VR in the Classroom

Required specifications:

- A gyroscope and accelerometer: This is essential for determining orientation and doing head-tracking in virtual reality viewer.
- Android 4.4 or later OR iOS 8.0 or later
- 1GB ram

Even if your phone meets the required specifications, some devices may still not be able to use Expeditions. For more certainty and a better experience, we recommend some additional specifications and features.

Recommended specifications:

- GPU comparable with an Adreno 330
- High resolution screen: 720p or 1080p is recommended.
- Minimum of 2GB ram, 3 or 4 would be better
- 2.4ghz and 5ghz Wi-Fi support
- VR viewer compatible screen size (check the specifications for your viewer for recommended screen size)

To purchase class-sized Google kits: [Best Buy for Education](#)

Need help getting your kit funded? Consider setting up a project on [DonorsChoose.org](#)

A.3 Instruments for Formative Evaluation

A.3.1 Interview Dialogue and Questions for Instructional Design Expert

Workshop Design Dialogue:

Thank you for taking the time to reflect on our workshop design. Your feedback will be used to help us make any revisions needed in the VR learning experiences and teaching methods. It is important for us to know this information so that we can better prepare educators to include VR in their classroom. Please be honest and thorough in your responses to the questions. This interview is expected to last between 30-60 minutes. Before we begin, do you have any questions?

Open-ended Questions After Reviewing Workshop Design:

1. Is there a clear focus to the workshop?
2. Do the objectives align with the goals of the workshop?
3. Are the learning objectives observable and/or measureable?
4. Is the content of the workshop well organized?

Workshop Observation Dialogue:

Thank you for taking the time to observe and reflect on the workshop presentation and learning experiences. Once again, your feedback is valuable to us for workshop revisions and improvements. As you already know, we want to make sure that our learning experiences and training methods are appropriate and valuable to the educators in our workshop. Please be honest and thorough in your responses to the following questions. This interview is expected to last between 30-60 minutes. Before we begin, do you have any questions?

Open-ended Questions After Workshop Observation :

1. Are the sessions appropriately designed for demonstration, practice, and application?
2. Do the learning experiences and instructional methods align and support the learning objectives?

3. Are the VR experiences and apps appropriate for teachers of 6th-12th grade?
4. Is the timeline of the workshop appropriate?

A.3.2 VR in the Classroom: Formative Survey

Instructions: This survey is intended to obtain information on educators' actual learning experience during VR training. Please select the answer for each question that best represents your learning experience during the VR training workshop. Some questions are open ended. Thank you for your participation!

1. How familiar are you with virtual reality?

- ❏ No previous experience
- ❏ Limited experience
- ❏ Some experience
- ❏ Extensive experience

2. Are the workshop learning objectives clear and well organized?

- ❏ Strongly Agree
- ❏ Agree
- ❏ Neutral
- ❏ Disagree
- ❏ Strongly Disagree

3. Are the learning objectives covered appropriately throughout the four virtual reality content areas?

- ❏ Strongly Agree
- ❏ Agree
- ❏ Neutral
- ❏ Disagree
- ❏ Strongly Disagree

4. Are the virtual reality workshop four content areas presented in meaningful sequential steps?

- ❏ Strongly Agree
- ❏ Agree
- ❏ Neutral

❏ Disagree
❏ Strongly Disagree

5. Do you feel that each workshop session is adequate for demonstrating and practicing in all apps and experiences?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

6. In terms of ease of use, how did the various technologies discussed in training work for you?

7. Did the training provide varied virtual reality experiences?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

8. Did each workshop session appropriately prepare you to teach the virtual reality experience or app in your classroom?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

9. Are the virtual reality experiences and apps appropriate for the individual educator's grade level?

❏ Strongly Agree
❏ Agree

❏ Neutral
❏ Disagree
❏ Strongly Disagree

10. Are the lesson planning and peer reflection valuable tools for embedding virtual reality experiences into your lesson planning?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

11. Do you now feel that you can competently implement the Google Expeditions into your curriculum?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

12. Do you now feel that you can competently implement New York Times VR into your curriculum?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

13. Do you now feel that you can competently implement the Augment app into your curriculum?

❏ Strongly Agree
❏ Agree
❏ Neutral
❏ Disagree
❏ Strongly Disagree

14. Do you now feel that you can competently implement Google Street View into your curriculum?

- ❏ Strongly Agree
- ❏ Agree
- ❏ Neutral
- ❏ Disagree
- ❏ Strongly Disagree

15. If you experienced any technology issues or problems during the training, did they interfere with your learning? If so, how?

16. Were there any virtual reality experiences that you would recommend for future training sessions?

17. Are there any suggestions or recommendations that you would have in order to improve future training sessions?

Survey Link: [Formative Survey](#)

A.3.3 Event Registration Form

Instructions: The data collected in this form will be kept confidential. The data will be used to complete pre-workshop and post-workshop evaluation.

1. Name:

2. Email:

3. Age:

4. Gender:

5. City/ State/ School:

6. What grade do you teach?
- ❏ 6th
- ❏ 7th
- ❏ 8th
- ❏ 9th
- ❏ 10th
- ❏ 11th
- ❏ 12th
- ❏ Other

7. What subject do you teach?

8. Years of experience?

9. Will you attend both days?
- ❏ Yes
- ❏ No

10. Do you have any previous training in technology applications? If yes, please explain.
- ❏ Yes
- ❏ No
- ❏ Explain: _____

11. On a scale from 1 to 5, please rate how comfortable you are using technology in the classroom:
- ❏ 1
- ❏ 2
- ❏ 3
- ❏ 4
- ❏ 5

12. Do you currently embed technology into your lesson plans?
- ❏ Yes
- ❏ No

13. What kind of applications do your students use on a regular basis?
On a scale from 1 to 5, please rate how comfortable are you integrating new technology into the classroom:

❏ 1
❏ 2
❏ 3
❏ 4
❏ 5

14. On a scale from 1 to 5, please rate your attitude towards using technology with your students:
❏ 1
❏ 2
❏ 3
❏ 4
❏ 5

15. On a scale from 1 to 5, how likely are you to implement VR technology into your classroom?
❏ 1
❏ 2
❏ 3
❏ 4
❏ 5

16. What motivated you to take this workshop?

17. What benefit do you expect to gain from VR in the classroom training?

18. What do you expect to be able to do by the end of the workshop?

19. Which instructional method do you prefer?
❏ Lecture
❏ Group Work
❏ Combination
❏ Other

20. If given a preference on a learning method, which would you choose?
❏ Learn by reading

- ❏ Listening
- ❏ Oberserving
- ❏ Doing

21. From whom do you prefer receiving feedback?
- ❏ Instructor
- ❏ Peers
- ❏ Combination

Survey Link: [Event Registration](#)

A.4 Summative Evaluation Instruments

A.4.1 VR in the Classroom: Summative Survey

Instructions: This survey is intended to obtain information on educators' actual application experience following VR training. Please select the answer for questions 1-8 that best represents your actual VR in the classroom implementation experience. This survey should take 5-10 minutes to complete. Thank you for your participation!

1. Are you using VR in the classroom with students?

- ❏ Yes
- ❏ No

2. Are you using VR in the classroom to collaborate with other educators?

- ❏ Yes
- ❏ No

3. If you answered NO in 1 or 2, please explain in detail the reasons that you are not using VR in the classroom.

| |
| |

4. Were you able to access and create virtual field trip lessons using Google Expeditions to meet your needs?

- ❏ Yes
- ❏ No

5. Were you able to access and create lessons using NY Times virtual reality videos and stories to meet your needs?

- ❏ Yes
- ❏ No

6. Were you able to access and create lessons using 3D virtual models to meet your needs?

- ❏ Yes
- ❏ No

7. Were you able to access and create lessons using Google Street View to meet your needs?

- ❏ Yes
- ❏ No

8. If you answered NO to questions 4, 5, 6, or 7, please provide the reasons that you were unable to access or create lessons in each VR application.

Survey Link : Summative Evaluation

A.4.2 VR in the Classroom: Follow-up Questionnaire

Instructions: This questionnaire aims to gauge educators' retrospective feelings regarding their practical application experiences following VR training. Please rate statements 1-6 according to your level of agreement with each, whereas 1 indicates strong agreement and 5 indicates strong disagreement. Next, please provide detailed answers questions 7-11 pertaining to your VR implementation experience. This questionnaire should take 15-20 minutes to complete. Thank you for your participation!

1. I feel my understanding of VR in the classroom is different now than before I took the workshop.

- ❏ 1 Strongly Agree

- ❏ 2 Agree
- ❏ 3 Neutral
- ❏ 4 Disagree
- ❏ 5 Strongly Disagree

2. The instruction and materials provided met my needs.
- ❏ 1 Strongly Agree
- ❏ 2 Agree
- ❏ 3 Neutral
- ❏ 4 Disagree
- ❏ 5 Strongly Disagree

3. The level of engagement in the workshop increased my understanding of VR in the classroom.
- ❏ 1 Strongly Agree
- ❏ 2 Agree
- ❏ 3 Neutral
- ❏ 4 Disagree
- ❏ 5 Strongly Disagree

4. The variety of VR applications demonstrated increased my interest in introducing VR in the classroom.
- ❏ 1 Strongly Agree
- ❏ 2 Agree
- ❏ 3 Neutral
- ❏ 4 Disagree
- ❏ 5 Strongly Disagree

5. I had access to all the VR equipment needed to perform the goals presented in the workshop.
- ❏ 1 Strongly Agree
- ❏ 2 Agree
- ❏ 3 Neutral
- ❏ 4 Disagree
- ❏ 5 Strongly Disagree

6. I had the district support I needed to implement VR in the classroom.
- ❏ 1 Strongly Agree

❏ 2 Agree
❏ 3 Neutral
❏ 4 Disagree
❏ 5 Strongly Disagree

7. Please list all technologies for which you had access after the workshop.

8. Which VR applications, if any, have you adopted as a result of the workshop? Why?

9. Do you feel you gained the skills to implement the goals outlined in the workshop into your classroom? Please explain.

10. Do you feel that you had reasonable means to access funding for VR equipment? Please explain.

11. Are there any other thoughts or concerns you would like to share regarding your experience with implementing VR in the classroom?

Questionnaire Link: Follow-up Questionnaire

A.4.3 Implementation Rating and Observation Form

School:	Grade:	Subject:
Observer:	Educator:	Date:

Part I. Implementation Rating

Rate the following observable behaviors and practices using the following rating scale:

E= Erratically   Behavior/practice is not observed at all or it is observed below minimum expectations

G= Generally   Behavior/practice is observed but not done consistently or done consistently but the quality does not meet minimum expectations

C=Consistently   Behavior/practice is always done and the quality exceeds minimum expectations

Observable Behaviors and Practices:

Demonstrates enthusiasm for the technology and the VR experience.	E	G	C
Adheres to an organized lesson plan to present VR experience.	E	G	C
Provides learners with context before or during for the VR experience.	E	G	C
Demonstrates operational knowledge of the given VR application.	E	G	C
Provides clear and accurate information to learners.	E	G	C
Effectively answers learner questions regarding the VR application.	E	G	C
Effectively troubleshoots technology issues related to the VR application.	E	G	C
Requests assistance or clarification from district IT support as needed.	E	G	C
Measures learning outcome through any means (i.e. quiz, discussion)	E	G	C
Follows appropriate district IT and safety policies during VR experience.	E	G	C

PART II. Observations Based on Kirkpatrick's Four Level Evaluation Model

	Evaluation Points:	Comments

Reaction	How did the educator deliver the instruction?	
	Was the educator engaged with the instruction and complete it successfully?	
Learning	Did the educator acquire the intended knowledge and skills?	
	What learning is evidenced by this experience? How is this learning measured or observed? Describe.	
Behavior	Is the educator applying knowledge and skills from the VR training?	
	Was the learning transferred to the class?	
Results	Did the learning impact productivity and motivation?	
	Did the learning meet the big goals?	

APPENDIX B: Materials, Schedules and Implementation

B.1 Table of Learning Experiences and Instructional Strategies

Goal 1: Educators will be able to access and create virtual field trip lessons with proficient use of Google Expeditions.

Behavioral Objectives for Learners	Type of Learning	Instructional Strategy	Rationale
1.1 Following a presentation on how to open and download the Google Expeditions app, each participant will be able to complete the steps on their own device.	Facts, Procedural, Application	Explain, Demonstrate, Recall, Model, Practice	The participants will need to know how to open and download the Google Expeditions app.
1.2 Following a presentation, each participant will be able to use Google Cardboard to view a Google Expeditions demo.	Facts, Procedural, Application	Explain, Demonstrate, Recall, Model, Practice	The participants will need to know how to use Google Expeditions in the Google Cardboard.
1.2 Following a presentation, each participant will be able to identify a Google Expedition to lead.	Procedural, Application	Explain, Demonstrate, Practice	The participants will need to know how to identify Google Expeditions to lead.
1.3 Following a presentation, each participant will be able to navigate all aspects of a Google Expedition.	Procedural, Application	Explain, Demonstrate, Recall, Model, Interact, Practice	The participants will need to gain enough knowledge about Google Expeditions to be able to teach it.
1.4 Each participant will be able to work in small groups to write a lesson plan using a Google Expedition that is appropriate for their grade-level curriculum .	Application	Apply, Design, Plan, Discuss	The participants will need to know how to embed Google Expeditions into their lessons.
1.5 Following the creation of a lesson plan incorporating Google Expeditions, each participant will present their lesson plan to peers	Application	Apply, Demonstrate, Evaluate, Discuss	The participants will need to know how to present the lesson with the embedded Google Expedition.

for small group evaluation.			
1.6 Following presentations and group evaluation, each participant will use peer feedback to revise and refine their lesson plan.	Application	Evaluate, Discuss, Revise	The participants will need to know how to revise their lesson with peer feedback.
Motivational	Ask the participants if they would like to create a learning experience from their curriculum that would be realistic, exciting, and engaging for students. Explain that this experience would allow the educator to take their whole classroom on a "field trip" beyond the classroom walls that would not otherwise be possible.		
Initial Presentation	First, Google Expeditions will be presented and explained. Second, the instructor will demonstrate how to use Google Expeditions and Google Cardboard. Third, the instructor will guide the participants through hands-on activities using Google Expeditions. Finally, the participants will independently practice Google Expeditions.		
Generative Strategy	The participants will utilize new knowledge and hands-on activities to be able to use and lead a chosen Google Expeditions on their own.		

Goal 2: Educators will be able to access and create lessons with proficient use of NY Times virtual reality videos and stories.

Behavioral Objectives for Learners	Type of Learning	Instructional Strategy	Rationale
2.1 Following a presentation on how to open and download New York Times VR, each participant will be able to complete the steps on their own device.	Facts, Procedural, Application	Explain, Demonstrate, Recall, Model, Practice	The participants will need to know how to open and download the New York Times VR.
2.2 Following a presentation, each	Procedural, Application	Explain, Demonstrate,	The participants will need to know how to

		Recall, Model, Interact, Practice	access 360° videos and stories on the New York Times app and to use them in the VR mode.
participant will be able to use New York Times VR to view and experience 360° videos and stories in the VR mode.			
2.3 Following a presentation, each participant will be able to identify 360° videos or stories that are appropriate for their grade level.	Application	Explain, Demonstrate, Identify, Evaluate	The participants will need to know how to identify relevant 360° videos and stories for their grade level.
2.4 Each participant will be able to work in small groups to write a lesson plan using a 360° video or story that is appropriate for their grade-level curriculum .	Application	Apply, Design, Plan, Discuss	The participants will need to know how to embed New York Times VR 360° videos and stories into their lessons.
2.5 Following creation of a lesson plan incorporating New York Times VR, each participant will present their lesson plan to peers for small group evaluation.	Application	Apply, Demonstrate, Evaluate, Discuss	The participants will need to know how to present the lesson with the embedded New York Times VR experience.
2.6 Following presentations and group evaluation, each participant will use peer feedback to revise and refine their lesson plan.	Application	Evaluate, Discuss, Revise	The participants will need to know how to revise their lesson with peer feedback.
Motivational	Ask the participants if they would like the opportunity to engage their students in an immersive video experience. Explain that New York Times VR would allow the educator to provide a unique opportunity for students to place themselves into 360° videos and stories to view events firsthand.		

Initial Presentation	First, New York Times VR will be presented and explained. Second, the instructor will demonstrate how to use New York Times VR in the Google Cardboard. Third, the instructor will guide the participants through hands-on activities using New York Times VR. Finally, the participants will independently practice using and identify videos and stories in New York Times VR.
Generative Strategy	The participants will utilize new knowledge and hands-on activities to be able use and navigate the New York Times VR app on their own.

Goal 3: Educators will be able to access and create lessons with proficient use of 3D virtual models.

Behavioral Objectives for Learners	Type of Learning	Instructional Strategy	Rationale
3.1 Following a presentation, each participant will be able to download and open the Augment app in Google Play or App Store.	Facts, Procedural, Application	Explain, Demonstrate, Recall, Model, Practice	The participants will need to know how to open and download the Augment app.
3.2 Following a presentation, each participant will be able to take a picture of an item in class to display in 3D mode.	Procedural, Application	Explain, Demonstrate, Recall, Model, Interact, Practice	The participants will need to know how to thoroughly use the Augment app.
3.3 Following a presentation and hands-on group activities, each participant will be able to Identify items that students can make into 3D models in order to enhance a curriculum based project.	Facts, Procedural, Application, Identification	Explain, Demonstrate, Recall, Identify, Practice	The participants will need to know how to identify relevant items to use for 3D models.
3.4 Following a presentation and hands-on group activities, each participant will be	Procedural, Application	Apply,Design, Plan, Discuss	The participants will need to know how to embed Augment

able to create a lesson plan incorporating a 3D model requirement made in Augment.			opportunities into their lessons.
3.5 Following the creation of a lesson plan incorporating a 3D model requirement made in Augment, each participant will present their lesson plan to peers for small group evaluation.	Application	Apply, Demonstrate, Evaluate, Discuss	The participants will need to know how to present the lesson with the embedded Augment app experience.
3.6 Following presentations and group evaluation, each participant will use peer feedback to revise and refine their lesson plan.	Application	Evaluate, Discuss, Revise	The participants will need to know how to revise their lesson with peer feedback.
Motivational	Ask the participants if they would like to bring classroom activities to a new level where projects can become interactive and engaging. Explain that the Augment app will allow students to create 3D models using their work from class.		
Initial Presentation	First, Augment app will be presented and explained. Second, the instructor will demonstrate how to use the Augment app with their device. Third, the instructor will guide the participants through hands-on activities and model making utilizing the Augment app. Finally, the participants will independently practice using and making 3D models on the the Augment app.		
Generative Strategy	The participants will utilize new knowledge and hands-on activities to be able to create 3D models using the Augment app independently.		
Goal 4: Educators will be able to access and create lessons with proficient use of Google Street View.			
Behavioral Objectives for Learners	**Type of Learning**	**Instructional Strategy**	**Rationale**

4.1 Following a presentation, each participant will be able to download and open Google Street View app on their own device.	Facts, Procedural, Application	Explain, Demonstrate, Recall, Model, Practice	The participants will need to know how to open and download the Google Street View app.
4.2 Following a presentation, each participant will be able to access and open a photo on Google Street View.	Procedural, Application	Explain, Demonstrate, Recall, Model, Interact, Practice	The participants will need to know how to access photos on the Google Street View app.
4.3 Following a presentation, each participant will be able to navigate all aspects of Google Street View.	Procedural, Application	Explain, Demonstrate, Recall, Practice	The participants will need to know how to properly use the Google Street View app.
4.5 Following a presentation and hands-on group activities, each educator will Identify a Google Street View photo that can be used in their grade level curriculum.	Facts, Procedural, Application, Identification	Explain, Demonstrate, Identify, Evaluate	The participants will need to know how to identify relevant Google Street View photos for their grade level.
4.6 Following a presentation and hands-on group activities, each participant will be able to create a lesson plan incorporating a Google Street View photo.	Procedural, Application	Apply,Design, Plan, Discuss	The participants will need to know how to embed Google Street View experiences into their lessons.
4.7 Following creation of a lesson plan incorporating a Google Street View photo, each participant will present their lesson plan to peers for small group evaluation.	Application	Apply, Demonstrate, Evaluate, Discuss	The participants will need to know how to present the lesson with the embedded Google Street View experience.
4.8 Following presentations and group	Application	Evaluate,	The participants will

evaluation, each participant will use peer feedback to revise and refine their lesson plan.		Discuss, Revise	need to know how to revise their lesson with peer feedback.
Motivational	Ask the participants if they would like to adapt their regular classroom activities into more engaging activities for all students. Explain that the Google Street View can transform typical activities into exciting, authentic experiences for their students.		
Initial Presentation	First, Google Street View will be presented and explained. Second, the instructor will demonstrate how to use the Google Street View with their device. Third, the instructor will guide the participants through hands-on activities using Google Street View. Finally, the participants will independently practice using Google Street View on their own device.		
Generative Strategy	The participants will utilize new knowledge and hands-on activities to be able use Google Street View independently.		

B.2 Materials for Training Program

B.2.1 Google Expeditions Training Center Sample Cards

Pre-Expedition Prep

The first step is to preview the experience yourself. Just like you might scout a museum or field trip location before taking your class there, going on the Expedition before presenting it to your class will help you establish talking points and prepare supporting activities. Below are some tips for previewing the trip:

- Explore both from your teacher tablet and student viewfinders. The teacher view on the tablet provides extra information and tools, but the student experience truly transports you to the location. Experiencing both will help you see the location from both perspectives.
- Take your time while you explore--don't rush it! Think like a detective--what details and talking points do you see at each point of interest?
- Ask yourself:
  - What points of interest pop out to me?
  - What surprises me about this Expedition?

- ○ How is this view different from a 2D picture?
- ○ What new information do I gain by being immersed in a 360 experience?
- ○ What challenges arise from a 360 experience as compared to a 2D experience?
- ○ What points of interests do I want to draw my students toward?
- ○ What information do I want to give them about these points of interest?
- ○ What information do I want them to infer about these points of interest?
- ○ Do I want to guide their exploration from the beginning, or allow them to freely explore?
- ○ What questions do I want to ask them?

- ● Read the annotations on the panorama cards on the bottom of the screen to familiarize yourself with details, points of interest, and sample questions related to the Expedition.
- ● Determine when in the learning cycle you want this to occur:

  - ○ At the beginning of study to ignite interest (i.e. visiting Romeo and Juliet's Verona as an activator before reading the play)
  - ○ In the middle of study to provide clarification / deeper understanding (i.e. visiting Verona mid-reading to provide context, deepen understanding)
  - ○ At the end of study to apply/extend learning (i.e. visiting Verona after reading so students can find and point out features on their own)

- ● To get the most of an Expedition, it should be preceded and followed with connected learning activities. The Expedition itself is one powerful piece of the instructional puzzle. So as you're planning for the experience consider the following learning activities for before, during, and after the Expedition."

Before the Expedition

Engage students in activities to provide some prior knowledge and context for the Expedition. It's usually helpful for students to list what they will look for as they explore. Some examples include:

- ● Objective: Establishing empathy and understanding for various cultures
  - ○ Expeditions: The Teepee, Out of Syria: Back into school, Buckingham Palace

- ○ Pre-Expedition Activity: Explore your own living environment. Make a list of what features of your home are needed to survive. Make another list of special or unique features about your home. Hypothesize what items or features you might find in each of the three locations you are visiting.

- Objective: Selecting your college of choice
  - ○ Expeditions: Various College Campuses
  - ○ Pre- Expedition Activity: Create a list of wants and needs for a college of choice. Consider how your daily life and academic life could be impacted by the college's location and campus.

During the Expedition

Consider the points of interest on each Expedition that you'll point out to students. Look for the points on the panorama cards on the bottom of the screen but also those that stuck out to you as you did the Expedition yourself. Script out the questions you'll ask and map out times for students to put down the viewfinders and discuss what they are seeing with one another. During the Expedition, here are some ideas for activities to keep students focused on the lesson objectives while also allowing them freedom to explore and find their own new learning:

- Give them a list of guiding questions in a Google Doc to collaboratively investigate during the Expedition. As a group, they can find and discuss answers to these questions. Try to mix your questions with lower order "easy to answer" factual questions and higher order discussion questions to vary the type of thinking your students are engaging in.
- Ask students to come up with new questions and wonders inspired by what they are seeing. For example, while on the Sharks Expedition, perhaps your students may wonder why the sharks aren't attacking or eating the school of fish around them. Or they may want to know how sturdy that diving cage is. They could list these questions in the same shared Google Doc that their guiding questions came in. Pro Tip: Use Google Classroom to disseminate and collect this doc!
- Have students reference other resources to build meaning during the Expedition. As they explore, encourage them to look for YouTube videos, articles or other reference materials that can help them aid their understanding of what they are seeing. For example, they may see a Rhinoceros beetle in the Borneo Rainforest expedition and observe the leaf behind it filled with holes. They could utilize other resources to investigate

whether the beetle did this and then return to the expedition to find other evidence of the beetle's eating habits.

After the Expedition

Once the Expedition is over and the virtual reality viewers have been put away or sent on to another classroom, the learning shouldn't end! It's now time to synthesize and apply the new knowledge. Some ideas for consideration:

- Have students follow up on the new questions and wonders they listed during the Expedition.

  - For example, students climbing Mount Everest might have wondered how to stay warm in the snowy heights of the mountain while still keeping your pack light. They may now engage in an interdisciplinary inquiry project to learn about body heat insulation and different types of materials (science) and the cost of outfitting a climb (math). They could even learn about how native cultures brave the elements and how their methods differ from those they researched (social studies).

- Return to the original unit of study and see how your students' perspective or understanding has shifted based on the Expedition. They could write reflections, blog posts or create video testimonials about their experience. Ask your class to share their reflections and discuss how their experiences differed from one another. Did every student see the same things? Did they ask the same questions? Did they have the same takeaways? Most likely the answer is no--so allow them time to share these differences with one another!

B.2.2 Google Expeditions Sample Lesson Plan

LESSON TITLE
LESSON BACKGROUND
Grade(s): Subject(s): Number of Students: Objectives:

| |
|---|
| Standards:
Essential Question:
Guiding Questions:
Vocabulary:
Place in Unit of Study (circle one): *Beginning / Middle / End*
Grouping (circle one): *Whole Class / Small Group* |
| **EXPEDITION PREP** |
| Selected Expedition:
Selected Points of Interest:
Additional videos / resources: |
| **BEFORE THE EXPEDITION** |
| Discussion Questions:
Student Activity *(How are students building background knowledge to prepare for the Expedition?)*: |
| **DURING THE EXPEDITION** |
| Discussion Questions *(include related points of interest, if applicable)*:
Student Activity *(How are students recording and processing what they learn from the Expedition?)*: |
| **AFTER THE EXPEDITION** |
| Discussion Questions:
Student Activity *(How are students synthesizing and analyzing what they learn from the Expedition?)*: |
| **EXTENSION IDEAS** |
| *What additional learning / inquiry was inspired by what students experienced on this Expedition?* |

B.2.3 Lesson Plan Peer Evaluation

Please evaluate each group member's lesson plan using the Criterion Checklist below. Group members will use the feedback you provide to refine their lesson plan.

This Criterion Checklist is applicable to lessons plans that incorporate the use of Google Expeditions and New York Times VR videos and stories.

1. **The lesson plan is appropriately aligned with and identifies specific grade level expectations (GLEs) and subject curriculum.**
2. **The lesson plan is well-organized and follows a specific instructional design model.**
3. **The lesson plan is designed with the user (student) in mind. Instructions for the use of technology during the activity are thoroughly explained.**
4. **The lesson plan is creative, engaging, and utilizes elements of VR for an immersive learning experience.**

Link: Peer Evaluation

B.2.4 Sample Session 1 Google Expeditions Slide-Show

Google Expeditions Overview

Google Expeditions is a collection of panoramas (360° photo spheres), 3D images and video, as well as ambient sounds for classroom virtual reality immersion.

Each experience has been curated with points of interest, annotated details, and teacher questions that guide the experience. The purpose is to bring the world to students and immerse them in the learning process.

The concept is simple. Google Expeditions has partnered with educational entities from all over the world in order to create virtual reality experiences for students. Organizations such as the American Museum of Natural History, The Planetary Society, and the Smithsonian are just a few of Google's collaborators.

Retrieved from: https://www.google.com/edu/expeditions/

Google Expeditions



Retrieved from:
https://www.google.com/edu/expeditions/

Google Cardboard Demo

| Search for the menu bar and tap screen to open Arctic Journey on the far right side of menu bar. | Tap LEARN and in menu. | Use Google Cardboard to explore the scene. |

Downloading Google Expeditions

Go to the Expeditions app in the Google Play Store (Android)
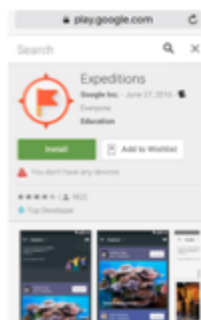
Go to Expeditions app in iTunes Apps Store (Apple).
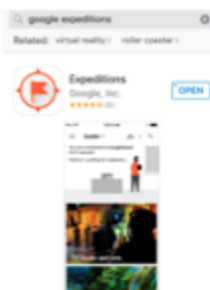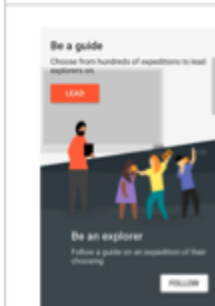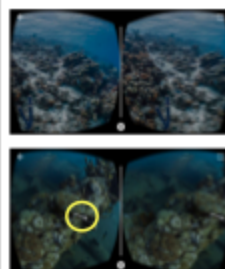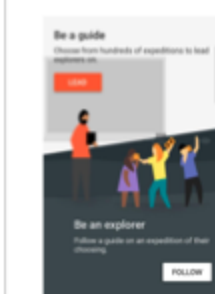
Leading an Expedition

Press Play.	Engage Explorers using notes, questions and information.	Explore Points of Interest.	To END the Expedition - X out on left of screen.

Creating a Lesson

Now that you have a working knowledge of Google Expeditions, it's time to create a lesson plan for your class that incorporates this resource.

1. Identify a Google Expedition that can be used with your grade level curriculum.

2. Review appropriate standards and GLEs.

3. Use the Virtual Reality Lesson Plan template to create a lesson incorporating the Google Expedition you chose.

Sample Template

Lesson Feedback

Let's continue becoming Google Expedition experts by working in small groups.

4. Share your Google Doc lesson plan with members of your peer review group.

5. Review each other's lesson plans using the Lesson Plan - Peer Evaluation form.

6. Use the remaining time in the workshop to revise your lesson plan. Ask members of your group or the instructors for any help or suggestions.

Google Expeditions

Thank you and see you tomorrow!
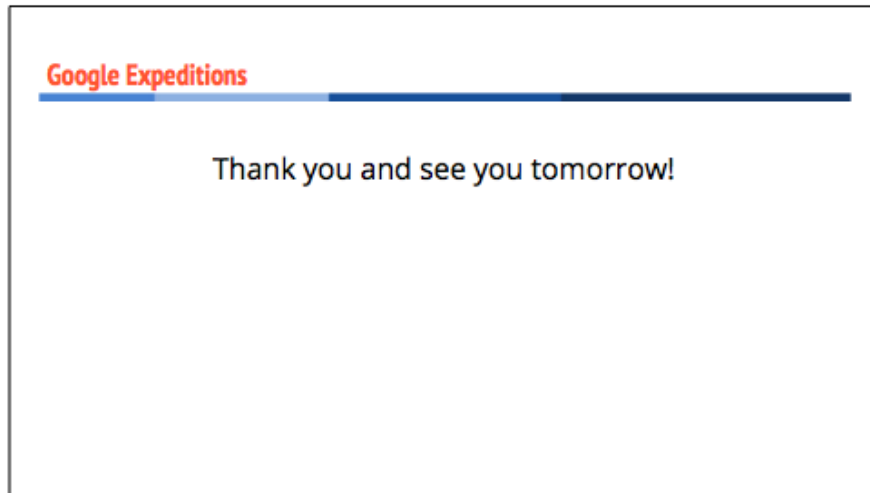
B.3 Implementation Schedule and Quick Start Guides

B.3.1 Implementation Schedule

Times	Day 1	Times	Day 2
8:00-8:30	Check-In and Welcome	8:00-8:30	Check-In and Welcome
9:00-10:30	**Session 1:** Introduction, Demonstration & Practice with Google Expeditions	9:00-10:30	**Break-Out Session 1** Google Expeditions
10:30-10:45	Break	10:30-10:45	Break
10:45-12:15	**Session 2:** Introduction, Demonstration & Practice with NY Times Stories	10:45-12:15	**Break-Out Session 2** NY Times VR stories
12:15-1:00	Lunch Break	12:15-1:00	Lunch
1:00-2:30	**Session 3:** Introduction, Demonstration & Practice with 3D Virtual Models	1:00-2:30	**Break-Out Session 3** 3D models in VR
2:30-2:45	Break	2:30-2:45	Break
2:45-4:15	**Session 4:** Introduction,	2:45-4:15	**Break-Out Session 4**

	Demonstration & Practice with Google Street View		Google Street View
4:15-4:30	Closing Comments/Questions	4:15-4:30	Closing Comments/Questions

B.3.2 Quick Start Guide

Program	Lesson Samples	Support/ Help
Google Expeditions	Adding Expeditions to Lesson	Expedition Support
NY Times VR	NY Times Learning Blog	NY Times FAQS
3D Models	Augmented Reality Lesson Ideas	Augment Support
Google Street View	Street View Sample Lesson Ideas	Google Street View Support