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VR Quest® STEAM Curriculum Guide
4th Grade English

Can You Survive in the Wilderness?

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

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The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and informational text, Can You Survive in the Wilderness? As the adage so eloquently states: "reading opens the door to unlimited knowledge."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text

Prepare to travel through the world of nature and survival as you gain insight into poisonous plants, predators and the beauty of nature. As you begin to develop questions about the duel edge of nature, you will be able to explore how different facets of the environment are interwoven.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the cycle of the raging rivers during a one month time period
- Determine the path of least resistance in Australia's Blue Mountains during a 48 hour journey
- Identify the various dangers one can encounter in the wilderness in a 24 hour period
- Compare and contrast the raging rivers to the Atlantic or Pacific Ocean during a two week time span

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of inventions in our society:
Possessing a solid ability to decipher, read and retain informational text is a major key in being successful in life. From reading street signs, directions and manuals, understanding informational text is a practical and necessary skill. While younger and less mature scholars often think of nonfiction as boring and related to testing, the right learning opportunities can entice reluctant readers. Reading and comprehension are essential to survival, not just in the wilderness but also in a modern world.

- Identify five ways informational text can save your life.
- Define different genres of informational text you come across in a day.
- Construct a how to manual for similar to the book just read.
- Determine survival series you could write based on different academic disciplines.
- Explain in essay format the importance of survival skills in a technological environment.

Know the significance of art, science and technology throughout mathematical history:
Information texts support various components of the arts, math, technology and science. Besides the obvious examples of disseminating content knowledge, informational texts also help to centralize key components, make transdisciplinary connections and help foster the "ah-ha" moment necessary for scholars to excel and master content.

In terms of survival research and knowledge, the arts can be implemented by utilizing photography to capture the journey and create a vlog, blog or regular journal. Artifacts from nature can be used for colleges, sculptures or other art pieces and elements.

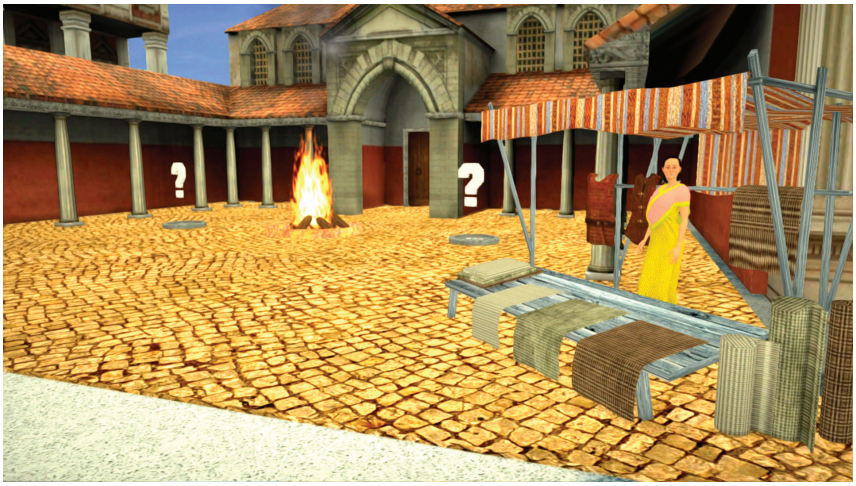
Math is best supported by using it to explain the compass and percentages or fractions as well as distances traveled. Lastly, science is a very important part of survival as someone needs to be able to identify safe leaves, berries and vegetables.

Explain how past practices are current and still used today:
While the environment and world have evolved, survival and necessary skills have not changed. Exploring the past to the present in terms of survival mode presents an excellent opportunity for scholars to compare and contrast traditional ways, methods and approaches to the new and model.

Additionally, whenever scholars learn to articulate their reflections, greater critically thinking is fostered and higher order thinking skills are promoted. Taking it to the next step, is to consider where the future will lead to and whether or not necessary skills to survive will evolve as well.

Taking it to the next level with critical thinking:
Alaska and the Australian Blue Mountains are both serene places of great beauty. There you can see nature at its finest and come into contact with animals that bring joy and peace since they are not often seen in person. They are also places of extreme danger that can rival the most dangerous cities. The dangers here are not as easy to master as something in an urban setting, especially if one has never been exposed to the wonders of the wild.

- Why or why not should survival skills be taught? If so, what skills are necessary?
- Determine if animals in the wilderness are friends or foes? If you approach them peacefully or leave them be, are you safe?
- Compare and contrast Washington's Cascade Mountains to the Australia's Blue Mountains. How are they the same and how are they different?
- Assess precautions taken when traveling or venturing outside of your comfort zone.
- Investigate whether outdoor survival is more complex than inner city survival and support your response with text evidence or research. Define emotional challenges faced by battling the harsh realities of nature.



VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The ability to think critically can mean the difference between life or death in extenuating circumstances. Like anything else, the mind is a muscle and when you practice using it over and over, it gets stronger. Learning to problem solve and think outside the box will help use this skill in all other aspects of life.

- Tell players to utilize various globes, maps and documents to show the location of where they are attempting to survive. How is it today? How was it 100 years ago? What has changed about it?
- Create a timeline of real life people and stories that encountered and survived the wilderness and all its obstacles.
- Explain mental mindsets that influence athletes, explorers or regular people in general to want to go into the wilderness and face nature's challenges. Illustrate the specific instances in history with respect to both survivors and those that did not survive and why they did not.
- Create a museum gallery walk of obstacles faced in your survival journey. Please include poisonous plants, fierce predators and dangerous conditions with specific references to the challenges encountered.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://secretsofsurvival.com/wilderness/

https://www.onlyinyourstate.com/alaska/survive-in-ak/

https://www.britannica.com/place/Blue-Mountains-New-South-Wales

https://bluemountains-australia.com/

http://www.walkthroughindia.com/wildlife/the-15-super-wild-predators-in-the-reserved-forest-of-indian-subcontinent/

https://digital-desert.com/wildlife/predators.html

https://www.wikihow.com/Survive-in-the-Desert#:~:text=How%20to%20Survive%20in%20the%20Desert%201%20Wear,during%20the%20day.%206%20...%20%28more%20items%29%20

https://www.wikihow.com/Survive-Being-Lost-in-the-Forest

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitve Accountable Talk Extension Stems

Based on the evidence . . .

The key information indicates / identifies / explains . . .

This reminds me of . . .

This is relevant because . . .

In summary, this means . . .

To expand / piggyback off of what _____ said . . .

I infer this represents . . .

I used to think _____, but now _____

What's important here is . . .

It's interesting that . . .

One thing we should notice is . . .

One thing we haven't considered is . . .

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:

– Did players understand the quest?

– Was all the information needed available to players?

– Did the story make sense?

– Were there things that misled players because they were unclear or inaccurate?

Interface:

– Did the interactive features work?

– Could the players navigate the landscape?

– Was the setting attractive, and in line with the theme of the quest?

– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:

– Was the quest at an appropriate level of difficulty?

– Did players stay interested in the quest?

– Were players able to complete the quest in a reasonable amount of time?

– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

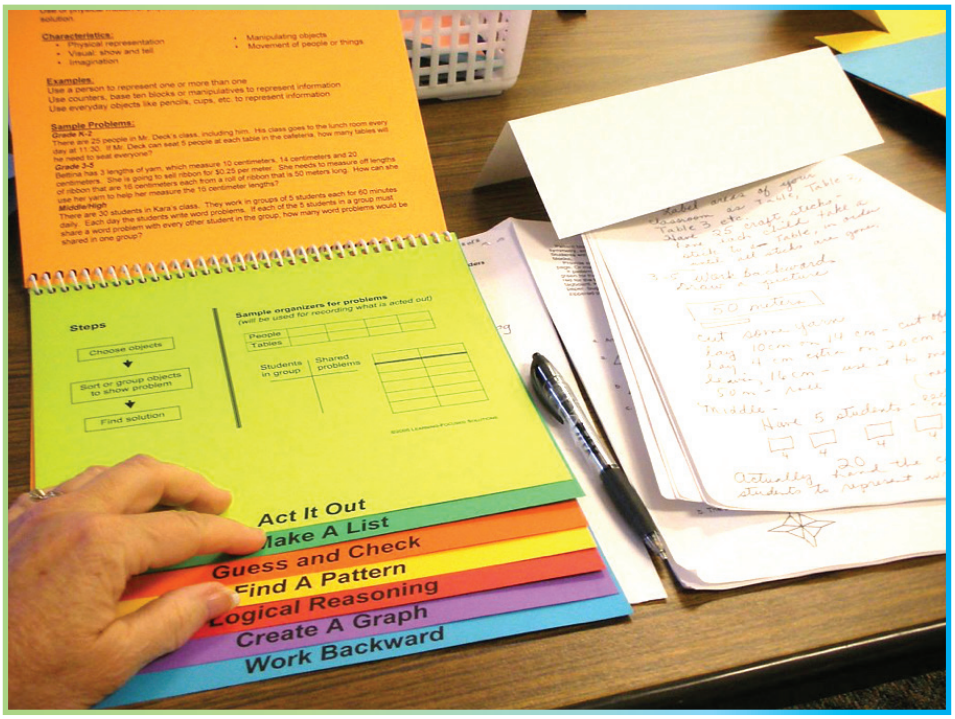
Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	4R1: Locate and refer to relevant details and evidence when explaining what a text says explicitly/implicitly and make logical inferences.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	4R2: Determine a theme or central idea of text and explain how it is supported by key details; summarize a text. 4R3: In literary texts, describe a character, setting, or event, drawing on specific details in the text. In informational texts, explain events, procedures, ideas, or concepts, including what happened and why, based on specific evidence from the text.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts		Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts			I.B1	5c
Illustrations	4R4: Determine the meaning of words, phrases, figurative language, academic, and content-specific words.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	3c
Informational Texts	4R5: In literary texts, identify and analyze structural elements, using terms such as verse, rhythm, meter, characters, settings, dialogue, stage directions. In informational texts, identify the overall structure using terms such as sequence, comparison, cause/effect, and problem/solution.	Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative	4R6: In literary texts, compare and contrast the point of view from which different stories are narrated, including the difference between first- and third-person narrations. In informational texts, compare and contrast a primary and secondary source on the same event or topic.	Uses various note-taking strategies.	IV.D1	6a
Opinion		Uses common organizational patterns to organize information.	II.D2	1b
Organization		Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	I.B2	1b
Point of View	4R7: Identify information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, illustrations), and explain how the information contributes to an understanding of the text.	Identifies and evaluates the important features for a good product.	I.A2	3c
Quotations		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	VI.A2	
		Restates ideas of others accurately and adds own perspective.		

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events** **Audience** **Organization** **Purpose**	4R8: Explain how claims in a text are supported by relevant reasons and evidence 4R9: Recognize genres and make connections to other texts, ideas, cultural perspectives, eras, personal events, and situations. 4RF4: Read grade-level text with sufficient accuracy and fluency to support comprehension. 4RF4a: Read grade-level text across genres orally with accuracy, appropriate rate, and expression on successive readings. 4RF4b: Use context to confirm or self-correct word recognition and understanding, rereading as necessary. 4W2: Write informative/explanatory texts to explore a topic and convey ideas and information relevant to the subject. 4W2a: Introduce a topic clearly and organize related information in paragraphs and sections. 4W2b: Develop ideas on a topic with facts, definitions, concrete details, or other relevant information; include text features when useful for aiding comprehension. 4W2c: Use precise language and content-specific vocabulary 4W2d: Use transitional words and phrases to connect ideas within categories of information. 4W2e: Provide a concluding statement or section related to the information or explanation presented.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	III.C2 III.B2 VI.C2	3c 6d 6a 7b

VR Quest® STEAM Curriculum Guide
4th Grade Math

Multiplication



Hamilton Buhl
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- Seek out the school librarian to support the research and to design instructional curriculum maps.
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The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into multiplication, a basis for everyday math, money and knowledge. As the adage so eloquently states: "all the math you need for the stock market you get in 4th grade." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of multiplication as you gain insight into representing verbal statements of multiplicative comparisons, using drawings and symbols, finding factor pairs as you make meaning of real life math and its implications.

As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an adventure in multiplication or a learning walk. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

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Here is a sample **SMART** objective:

Players will be able to:

- Explain equations as multiples pertaining to everyday applications like baking four rows of cupcakes with three cupcakes in each row for two timed baking cycles.
- Interpret statements as comparisons with a minimum of two representations within a 30 minute time frame. For example, interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 or 7 times as many as 5.
- Explain given rules of a multiple and why numbers will continually alternate in the pattern or sequence within a five minute span. For example, by utilizing the multiple of 3 with the starting with 1 will generate terms with the resulting alternating sequence even, odd.
- Apply concepts of multiplication, place value and division during a 10 minute period. For example, recognize 50*10=500 and therefore 500 / 50 =10 .

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Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
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Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of multiplication in our daily life:

Possessing a solid comprehension of multiplication fosters a transdisciplinary interaction with all core subjects as well as provides a foundation of all more advanced math. These skills will not only make you special by thinking more quickly, but also contribute to your personal growth and development. Additionally, understanding and applying algebra to your surroundings and everyday life will help you see the world through an all encompassing lens.

- Compare and contrast two different methods of multiplication? Who developed the two being compared? Why are the differences important to note and how does it affect today's scholars?
- Determine everyday implications for multiplication such as the number of party favors, drinks, cupcakes at a birthday party you are hosting.
- Define different unknowns in order to create and solve a multiplication problem you may encounter like going out with eight friends for slices of pizza. If everyone eats three slices how many pies do you need? What if four people eat three slices and four people eat four slices, then how many pies do you need?

Know the significance of art, science and technology in multiplication:

From civilization's early beginnings, art and math have had strong ties as they are integrated closely. Cubism, which is an early 20th century European art produced utilizing multiple repeated shapes relys heavily on the theory of multiplication. Visual and creative aspects of art and multiplication go hand in hand. The algorithms of multiplication and art coupled together are particularly helpful for visual learners and/ or English language learners to explore multiplication concepts in new and exciting ways.

Many scientists use multiplication concepts in their foundational work to build a base of their theories and translate their research. Additionally, much of technology utilizes very simple multiplication concepts and strategies. For instance, social media utilizes the data generated off of each user's search to create an algorithm of similar searches to be generated. Understanding that algorithm has strong business applications.

Explain the power of multiplication today:

Determine if multiplication has changed in any way. Define ways multiplication is used in early, formative years and how might it be used as you get older. From simple events like planning an event to investing in stocks or realizing the power of gym routines over a month's time, multiplication plays an important part in our lives. In the real world, multiplication equations are always present and many people do not realize.

Taking it to the next level with critical thinking and social sciences:

Often people mistakenly think math or multiplication has nothing to do with history or our past. But data and determining patterns or multiples are a very important part of understanding our staring points and guiding choices for the future. In history, there have been many infectious diseases or pandemics that have crossed the globe and wreaked havoc and chaos everywhere.

- Determine and describe a timeline of the different pandemic outbreaks with specific reference to the multiples seen in dates, data and patterns.
- Analyze the death toll from highest to lowest and represent that as a visual infographic multiplication statement.
- Assess data and create your own multiplication equation of a factual point in our most recent pandemic.
- Explain how getting exposed to Covid-19 is essentially a multiplication equation (hint: contact tracing).

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of multiplication with respect to sustainability provides tremendous benefits to our beautiful planet. Our environment provides a tangible avenue for scholars to best understand the power of multiplication through real life applications and truly experience that "ah ha" learning moment. Further, by applying mathematical concepts to our nation's problems, scholars are learning to problem solve through thinking outside the box as well as problem solving. Here are a few ideas:

- Tell players to locate all the litter in a community and make a multiplication equation. What affect would it have if 10 people picked up 10 pieces of litter a day? If 100 picked up 10 pieces? If 100 picked up 15 pieces?

- Sustainability not only helps the community and country, but it also improves agricultural productivity and enhances the status of human rights and working conditions. Consider the power of improved living and working conditions in a community of 3,000. What about of 5,000 or 10,000? What if you were to multiple that by more communities by 3s, 5s, 10s? What would the impact be in terms of lives affected?
- Create a museum gallery walk of contributions, timelines and historical notes of key people in cubism history like Pablo Picasso, Juan Gris, Robert Delaunay, Marcel Duchamp, Paul Cezanne, Georges Braque or Salvador Dali. Define the relevance of multiplication in their work.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.youtube.com/watch?v=Fgw0KTRHTT0

https://www.youtube.com/watch?v=eW2dRLyoyds

https://www.youtube.com/watch?v=C3PojOwjHcc

https://www.khanacademy.org/math/arithmetic-home/multiply-divide/mult-intro/v/basic-multiplication

https://www.thoughtco.com/tricks-to-learn-the-multiplication-facts-2312460

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Math Vocabulary Word Wall

Area	Conversion	Data
Decimals	Equation	Expression
Formulas	Line Plot	Measurement
Multiples	Quadulaterals	Perimeter
Place Value	Properties	Whole Numbers

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Explain	Explore	Express	Fluent	Generate
Identity	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method / Representation					

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:

– Did players understand the quest?

– Was all the information needed available to players?

– Did the story make sense?

– Were there things that misled players because they were unclear or inaccurate?

Interface:

– Did the interactive features work?

– Could the players navigate the landscape?

– Was the setting attractive, and in line with the theme of the quest?

– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:

– Was the quest at an appropriate level of difficulty?

– Did players stay interested in the quest?

– Were players able to complete the quest in a reasonable amount of time?

– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	4.OA.1 Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. Use drawings and equations with a symbol for the unknown number to represent the problem.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted.		IV.C1	3c
Informational Texts		Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details	4.OA.3a Represent these problems using equations or expressions with a letter standing for the unknown quantity.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative		Uses various note-taking strategies. Uses common organizational patterns to organize information.	IV.D1	6a
Opinion	4.OA.3b Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	II.D2	1b
Organization	4.OA.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors.	Identifies and evaluates the important features for a good product.	I.B2	1b
Point of View		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.A2	3c
		Restates ideas of others accurately and adds own perspective.		

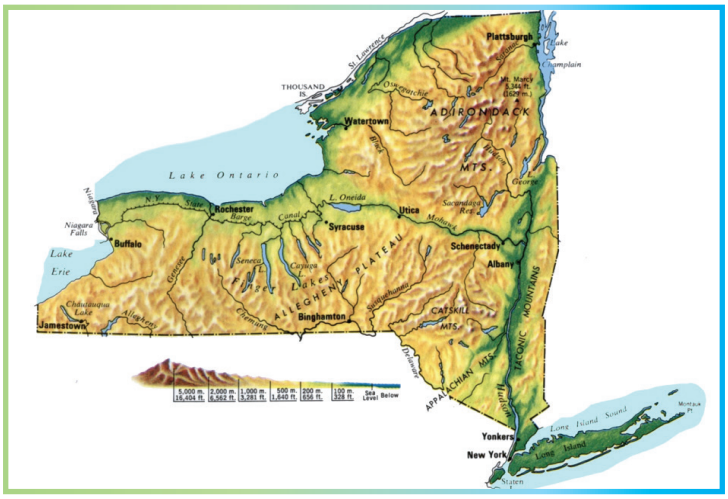
DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Quotations	Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite. 4.OA.5 Generate a number or shape pattern that follows a given rule. Identify and informally explain apparent features of the pattern that were not explicit in the rule itself. 4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. 4.NBT.2a. Read and write multi-digit whole numbers using base ten numerals, number names, and expanded form. 4.NBT.2b Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. 4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place. 4.NBT.4 Fluently add and subtract multi-digit whole numbers using a standard algorithm. 4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product.	VI.A2 III.C2 III.B2	3c 6d 6a
Reasoning				
Sequence of Events				
Audience				
Organization				

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.NF.1 Explain why a fraction *aa bb* is equivalent to a fraction *aa* × *nn bb* × *aa* by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. 4.NF.2 Compare two fractions with different numerators and different denominators. Recognize that comparisons are valid only when the two fractions refer to the same whole. 4.NF.3 Understand a fraction *aa bb* with a > 1 as a sum of fractions 1*bb* . 4.NF.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 4.NF.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions. 4.NF.3c Add and subtract mixed numbers with like denominators.	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation /product. Assesses and revises own work with guidance. Asks questions to clarify topics or details. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Identifies facts and details that support main ideas.	VI.C2	7b

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
	4.NF.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. 4.NF.4 Apply and extend previous understandings of multiplication to multiply a whole number by a fraction. 4.NF.4a Understand a fraction *aa bb* as a multiple of 1 *bb*. 4.NF.4b Understand a multiple of *aa bb* as a multiple of 1 *bb* , and use this understanding to multiply a whole number by a fraction. 4.NF.4c Solve word problems involving multiplication of a whole number by a fraction. 4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. 4.NF.6 Use decimal notation for fractions with denominators 10 or 100. 4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or < and justify the conclusions.	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation /product. Assesses and revises own work with guidance. Asks questions to clarify topics or details. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
4th Grade Social Studies

New York State Geography



Hamilton Buhl®
Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into history. As the adage so eloquently states: "in order to guide your future you must understand your past." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the New York State geography and gain insight by recognizing and analyzing different forms of evidence (maps, graphs, art, artifacts, photographs, oral histories) to make meaning of history. As you begin to develop questions about this great state, its history, the geography, economics and government, you will be able to explain chronologically how events are related to each other.

In this VR Quest®, you create an edventure in the diverse geography of New York State. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The VR Quest design screen

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain why geography matters and how it affects history, economics and government.
- Critique what makes a complex society with reference to specific time periods being studied.
- Define how people have immigrated and migrated to New York City and New York State and contributed to its cultural growth and economic development.
- Determine the strategic role of New York City and New York State in the Revolutionary War with respect to geography, battles, key figures, leaders, role of Native Americans, African Americans and women.

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk. Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the geography of New York State:
New York State has a diverse geography and very physical features. It has several Native American groups, mainly the Iroquois (Haudenosaunee) and Algonquian-speaking groups, who inhabited the region that was later known as New York. Native Americans interacted with the environment and developed unique cultures that helped make New York special and to this day, still contribute to the growth and development of the state.

The geographic features have greatly influenced location. Additionally, the role of environment, climate, natural resources and animals of the state, has propelled the development of Native American cultures in New York State.

- How has the location of New York State in relation to other states (countries/world/bodies of water and mountain ranges) helped define the culture of the economy, government, ways of life, customs, beliefs, values and traditions?
- Compare and contrast a region in New York State to another region by describing characteristics and historical events.
- Distinguish human-made features and human activities from "environments" (natural events or physical features like land, air, and water that are not directly made by humans).
- Assess how environments affect human activities and how human activities affect physical environments.
- Identify periods of time, decades and centuries, to put events into chronological order.

Know the significance of math, science and technology throughout New York State's history:
Native Americans employed mathematical skills to measure time in years and centuries. They were able to understand the difference between B.C.E. and C.E. Native Americans utilized the chronological significance of data present in their daily lives.

Mathematics was a central part of everyday life. It can be seen in the trade system and tools that were used. Science was also a major component of many Native American tribes as they utilized slash-and-burn methods to cultivate soil for farming purposes. Additionally, longhouses and wigwams were constructed on mathematical and scientific principles of ratios, symmetry and proportions.

Explain how past practices are current and still used today:
Define how Native Americans were very advanced in science and technology with agriculture and cultivation, a central aspect of daily life. Corn was planted with dead fish and beans. The dead fish supplied the nutrients for the plants while the beans grew close to the ground and kept much-needed moisture in the soil. The beans also acted as a natural deterrent to maize pests. These individual plantings were built on little mounds with indentions on top to collect rainwater.

Taking it to the next level with critical thinking:
Physical environment has influenced human activities and development throughout history. As society begins to expand and becomes more complex, people, laws and various new technologies shape history.

Examine some of the topics below:

- Determine and describe how human activities alter places and regions.
- Identify multiple perspectives from an historical event.
- Assess different types of political systems used throughout New York State history and in United States history as you reflect on the responsibilities and rights of a citizen to bring social justice and change.
- Investigate issues pertaining to differences and conflict in order to negotiate and compromise resolutions.
- Explain how individuals in positions of power can influence people's rights and freedom. When is social action required? Offer possible solutions to both past and current situations.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The geography of New York State provides a wealth of opportunities and challenges to design a quest where players discover more about New York City and New York State history as they face and overcome obstacles and problem solve.

Here are a few ideas:

- Tell players to utilize various globes, maps and documents to show the location of New York State in relation to other states (countries, world, bodies of water, mountain ranges) and specific bays (Jamaica, Lower and Upper New York Bay, Great South), rivers (Allegheny, Bronx, Delaware, East, Genesee, Harlem, Hudson, Mohawk, Niagara, Richelieu, St. Lawrence, Susquehanna), mountains (Adirondack, Appalachian, Catskill), islands (Fire, Long Island, Manhattan, Roosevelt, Governors, Liberty, Staten Island) and special areas (Allegheny Plateau, Atlantic Ocean, Long Island Sound, Niagara Falls, Palisades, Tug Hill Plateau). Highlight the political geographic features of New York City and New York State (Canada, Connecticut, New Jersey, Massachusetts, Pennsylvania, Vermont) and the major cities (Albany, Buffalo, New York, Rochester, Syracuse, Yonkers). Reference the boroughs of New York City (Bronx, Brooklyn, Manhattan, Queens, Staten Island).
- Geographic features influence location. Illustrate the role of climate, vegetation, topography, environment, natural resources and animals in the development of Native American cultures in New York State.
- Create a museum gallery walk of key people in early New York City development (Peter Minuet, Adriaen Van Der Donck, Peter Stuyvesant) and of major explorers of New York (Henry Hudson, Giovanni da Verrazano, Adriaen Block, Samuel de Champlain).

This lid and basket are made from Iroquois sweetgrass.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

http://www.bigorrin.org/algonquian_kids.htm

http://www.geocities.ws/mrwelchsocialstudies/algonquian_worksheet.pdf

https://www.ducksters.com/geography/us_states/new_york_history.php

https://navajocodetalkers.org/5-iroquois-facts-for-kids/

https://www.britannica.com/topic/Iroquois-people

https://native-american-indian-facts.com/Northeast-American-Indian-Facts/Iroquois-Indian-Facts.shtml

https://kidzfeed.com/new-york-facts-for-kids/

https://www.iloveny.com/things-to-do/culture/people-cultures/

https://kids.nationalgeographic.com/explore/states/new-york/#new-york-statue-of-liberty.jpg

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses all they've learned during the course of VR Quest® to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a New York State VR Quest®.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2

1. Player will guide the user through various physical geographic features of NYC and New York State.

2. Player comes to a body of water and discusses its importance to technology, transportation, growth, settlement and economic development.

Body Panels 3-10

3. Player must find cultural artifacts within New York.

4. Player recognizes the mathematical dimensions of Iroquois longhouses.

5. Player moves through selected region and discusses how the Iroquois used slash and burn methods to cultivate soil and fished and hunted.

6. Player continues narration focused on customs, values, traditions, beliefs and ways of life.

7. Young guide will recognize and explain how climate, vegetation and topography affect the growth and development of New York City and New York State.

8. Voice explains: *"Many individuals and businesses specialize and trade. This was the beginning of an economy system and it all goes back to geographic features since New York State has major waterways."*

9. Player walks around and distinguish between the various types of resources (human capital, physical capital, and natural resources) required to produce goods and services.

10. Player recognizes and identify patterns of continuity and change in New York.

Climax

11. Player needs the most important artifacts to present to the elders. *"Oh no! I don't have the most important artifact from my journey. What will I do?"*

Summary

12. Teamwork *"Congratulations, my friend. You found it. Great job!!"*

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 – 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

For example, this Iroquois spoon has a decorative squirrel at the top. It was used to ladle food and liquid substances. Different artifacts can illustrate what daily life was like or even what objects held cultural or spiritual importance in the Native American belief system.

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
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Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

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Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

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– Did players understand the quest?
– Was all the information needed available to players?
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Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
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– Was the quest at an appropriate level of difficulty?
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Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

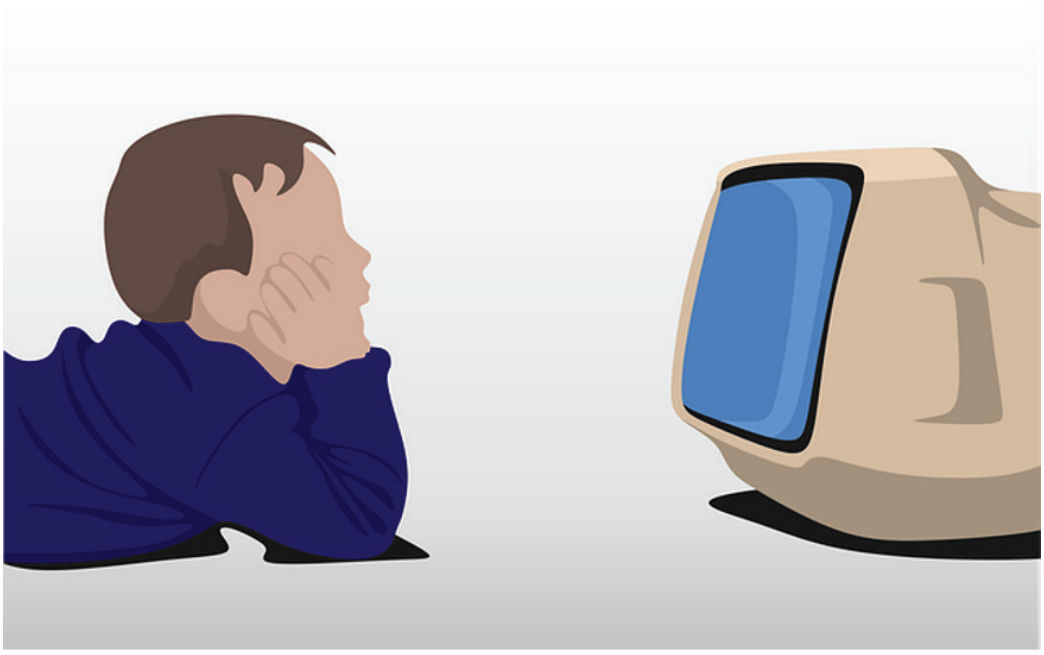
DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective **Domain Specific Vocabulary** **Explanatory Texts** **Facts** **Illustrations** **Informational Texts** **Key Details** **Narrative** **Opinion** **Organization** **Point of View** **Quotations**	W.4.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information. a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose. b. Provide reasons that are supported by facts and details. c. Link opinion and reasons using words and phrases (e.g., for instance, in order to, in addition). d. Provide a concluding statement or section related to the opinion presented. W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. c. Link ideas within categories of information using words and phrases (e.g., another, for example, also, because). d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Provide a concluding statement or section related to the information or explanation presented.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience. Distinguishes between fact and opinion. Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details. Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information. Uses pre-selected Web resources to locate information. Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions. Uses various note-taking strategies. Uses common organizational patterns to organize information. Uses pre-writing to brainstorm ideas for most effective way to present conclusions. Identifies and evaluates the important features for a good product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.	I.A1 V.A2 I.D1 I.B1 IV.C1 V.A1 III.B1 IV.D1 II.D2 I.B2 I.A2	3d 1b 3d 5c 3c 2b 3d 6a 1b 1b 3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events** **Audience** **Organization**	W.4.3. Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences. a. Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally. b. Use dialogue and description to develop experiences and events or show the responses of characters to situations. c. Use a variety of transitional words and phrases to manage the sequence of events. d. Use concrete words and phrases and sensory details to convey experiences and events precisely. e. Provide a conclusion that follows from the narrated experiences or events. W.4.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. W.4.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing. W.4.6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting. W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product.	VI.A2 III.C2 III.B2	3c 6d 6a

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	W.4.8. Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources. W.4.9. Draw evidence from literary or informational texts to support analysis, reflection, and research. a. Apply grade 4 Reading standards to literature (e.g., "Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text [e.g., a character's thoughts, words, or actions]."). b. Apply grade 4 Reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text").	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation /product. Assesses and revises own work with guidance. Asks questions to clarify topics or details. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
5th Grade English

The Boy Who Invented TV: The Story of Philo Farnsworth



Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with the informational text, The Boy Who Invented TV: The Story of Philo Farnsworth. As the adage so eloquently states: "reading opens the door to unlimited knowledge."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of innovation and history you gain insight into discovery, curiosity, thinking outside the box. As you begin to develop questions about this topic, its history, its relationship to anything new that is introduced and the first of its kind, you will be able to explain the importance of creativity vs. consumption and better understand how all academic disciplines are related to each other.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance TV to the technological world from its invention in 1927 to 2020
- Determine why Farnsworth defined the TV as a teaching tool to fight illiteracy in a 30 minute period
- Create a time line of Philo Farnsworth's life and invention within a 45 minute time span
- Compare and contrast the invention of the TV to the invention of Steve Jobs' first home computer within three class periods

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of inventions in our society:
From before America was first discovered and colonized, people have had ideas and have made inventions. Inventions are implemented to improve the quality of life and transform people, spaces and the standard of living. There have been many things invented in America that have gone global and helped people and cultures all around. Consider your daily life and the things you use and need, things you feel you cannot live without. Ask yourself how inventions come about. Is it out of need and wanting to improve the standard of living or do ideas just pop out?

- How did the location of where Philo Farnsworth lived affect him inventing something revolutionary and in establishing himself and his invention? Was he helped or hindered by where he lived and did moving better assist or create obstacles?
- Compare and contrast Philo Farnsworth to Steve Jobs. What observations and assumptions do you make and why?
- Determine an invention you can experiment with that will help mankind, make tasks easier or improve the quality of life.

Know the significance of art, science and technology throughout the mathematical history:
Inventions have roots in art, math, science and technology. The same process of trial and error that goes into bringing an idea to life is also the same process that goes into science experiments, creating great art, fostering new technologies or working out math problems.

The work is ongoing and the problems are not solved the first time around. But what does happen is a resilience is born where users learn to work through failure and learn from their mistakes. In doing so, greater work is accomplished. The mind is a powerful tool and from being inspired with ideas to making them a reality, genius is born.

In what ways did Farnsworth rely on science to make TV? How did TV advance technology? The motion pictures? How did it promote the arts? Additionally, what effect did the invention of TV have on the world? Consider how new America is as a country – how does this invention exemplify what the U.S. stands for and its approach to changing mindsets and soulsets?

Explain how past practices are current and still used today:
Define how the invention process and inventions of past are similar and different in the modern era. Many African American inventors and female inventors obtained patents. Sarah Boone was born a slave and later earned her freedom. Reflect on her mindset, mission and accomplishments.

Taking it to the next level with critical thinking:
The very people that are often mocked, criticized or scorned in real life and often the ones that have ideas that change the world. Many times people do not see their vision or understand where they are trying to go. Think Thomas Edison, Garrett Morgan, Frederick McKinley Jones, Henry Ford, Elan Musk, Steve Jobs, Madam CJ Walker, James E. West, Sarah Boone, Alexander Miles and the list goes on. Often, innovators and inventors are so far ahead of others that they are relentless and passionate about their work. Utilizing a thinking map, brainstorm all the greatest innovations that we have.

- Describe the invention process from beginning to end.
- Identify cause and effect that typical occurs when innovation is born.
- Create an infographic of African American inventors and their inventions. Determine (using data) if there are more diverse inventors now or back in history.
- Explain how come some inventors/innovators are so well known while others listed above you had to look up.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of how to solve community or global problems with respect to our environment and improved living conditions provide opportunities and challenges to test new designs, creations and innovations. Inventions are typical born from a need to solve a problem, make life a little easier and fluid. As many textbooks and social studies units are heavily concentrated on a traditional perspective, scholars do not usually learn of diverse or nonwhite men and women that actively contributed things we use daily in a modern society. Take time and reflect on the inventors of diversity.

- Tell players to utilize various globes, maps and documents to show the location of divers inventors. Create a timeline of their lives and accomplishments. What affect did their innovations have immediately and in the future?
- Geographic features and political conditions influence people and developments. Illustrate the specific turning points in history with respect to major inventions, highlights and discoveries.
- Create a museum gallery walk of contributions, timelines and historical notes of key African American inventors in history. Compare and contrast their experiences/life and process to what Philo Farnsworth went through.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.smithsonianmag.com/smart-news/farmboy-who-invented-television-while-plowing-180964607/

https://www.kidzworld.com/article/19948-the-story-of-philo-farnsworth-the-kid-who-invented-tv

https://articles.bplans.com/the-ultimate-inventors-guide-to-inventing-things/#:~:text=%20How%20to%20Start%20Inventing%20Things%20and%20Get,Once%20you%E2%80%99ve%20hit%20upon%20an%20idea...%20More%20

https://www.wikihow.com/Invent-a-Product

https://en.wikipedia.org/wiki/Philo_Farnsworth

http://www.byhigh.org/History/Farnsworth/PhiloT1924.html

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As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitve Accountable Talk Extension Stems

Based on the evidence . . .

The key information indicates / identifies / explains . . .

This reminds me of . . .

This is relevant because . . .

In summary, this means . . .

To expand / piggyback off of what _____ said . . .

I infer this represents . . .

I used to think _____, but now _____

What's important here is . . .

It's interesting that . . .

One thing we should notice is . . .

One thing we haven't considered is . . .

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

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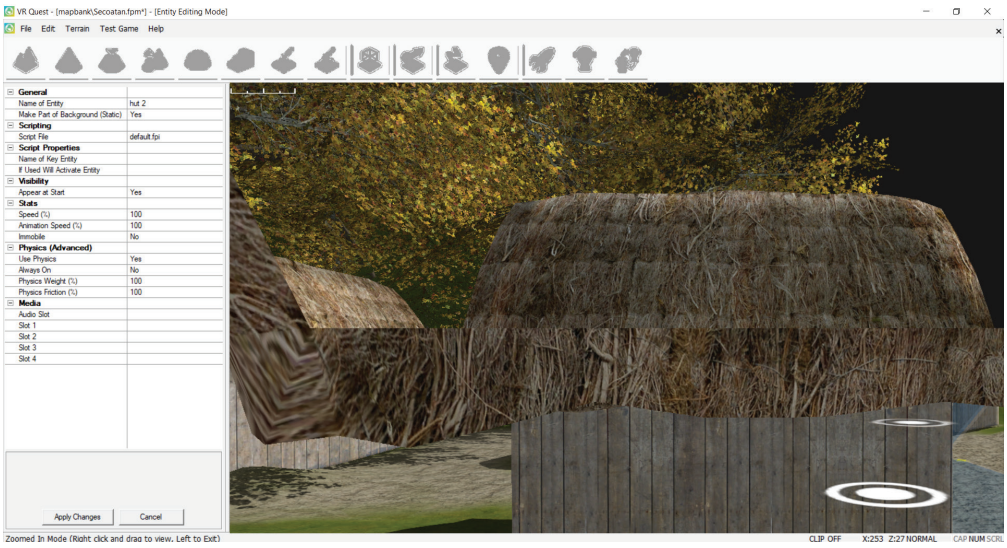

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In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

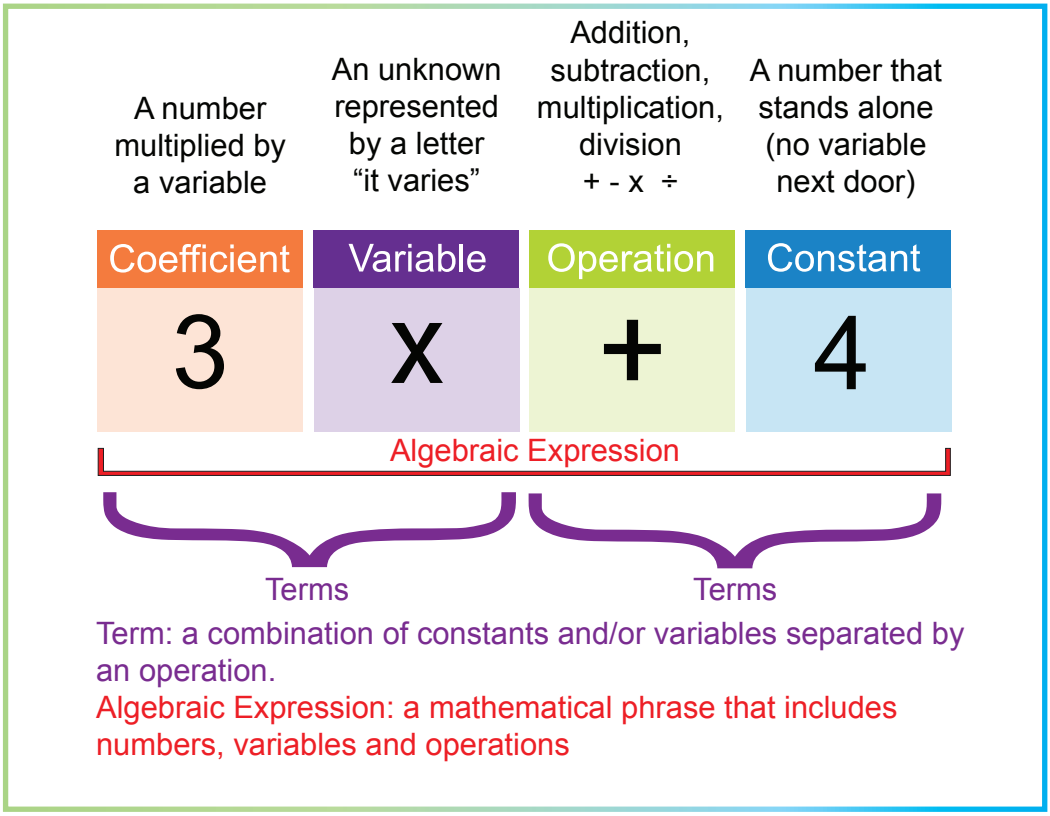
DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective **Domain Specific Vocabulary** **Explanatory Texts** **Facts** **Illustrations** **Informational Texts**	5R1: Locate and refer to relevant details and evidence when explaining what a text says explicitly/implicitly and make logical inferences. 5R2: Determine a theme or central idea and explain how it is supported by key details; summarize a text. 5R3: In literary texts, compare and contrast two or more characters, settings, and events, drawing on specific details in the text. In informational texts, explain the relationships or interactions between two or more events, individuals,ideas, or concepts based on specific evidence from the text. 5R4: Determine the meaning of words, phrases, figurative language, academic, and content-specific words and analyze their effect on meaning, tone, or mood. 5R5: In literary texts, explain how a series of chapters, scenes, or stanzas fits together to determine the overall structure of a story, drama, or poem. In informational texts, compare and contrast the overall structure in two or more texts using terms such as sequence, comparison, cause/effect & problem/solution. 5R6: In literary texts, explain how a narrator's or speaker's point of view influences how events are described. In informational texts, analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience. Distinguishes between fact and opinion. Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details. Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information. Uses pre-selected Web resources to locate information. Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions. Uses various note-taking strategies.	I.A1 V.A2 I.D1 I.B1 IV.C1 V.A1 III.B1	3d 1b 3d 5c 3c 2b

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Key Details **Narrative** **Opinion** **Organization** **Point of View** **Quotations**	5R7: Analyze how visual and multimedia elements contribute to meaning of literary and informational texts. 5R8: Explain how claims in a text are supported by relevant reasons and evidence, identifying which reasons and evidence support which claims. 5R9: Use established criteria to categorize texts and make informed judgments about quality; make connections to other texts, ideas, cultural perspectives, eras and personal experiences. (connections to other texts, ideas, cultural perspectives, eras, and personal experiences. 5W2:Write informative/explanatory texts to explore a topic and convey ideas and information relevant to the subject. 5W2a: Introduce a topic clearly, provide a general focus, and organize related information logically. 5W2b: Develop a topic with facts, definitions, concrete details, quotations, or other relevant information; include text features, illustrations &multimedia to aid comprehension. 5W2c: Use precise language & content-specific vocabulary to explain a topic. 5W2d: Use appropriate transitional/linking words, phrases, and clauses to clarify and connect ideas and concepts	Uses common organizational patterns to organize information. Uses pre-writing to brainstorm ideas for most effective way to present conclusions. Identifies and evaluates the important features for a good product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product.	IV.D1 II.D2 I.B2 I.A2 VI.A2	3d 6a 1b 1b 3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning	5W2e: Provide a concluding statement/ section related to the information or explanation presented.	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance		
Sequence of Events	5W2f: Establish a style aligned to a subject area or task.	Asks questions to clarify topics or details.		
Audience	5W3: Write narratives to develop real or imagined experiences or events using effective techniques, descriptive details, and clear event sequences.	Understands the concept of "audience;" determines audience before creating product.	III.C2	3c
Organization	5W3a: Establish a situation & introduce a narrator and/or characters.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	III.B2	6d
Purpose	5W3b: Use narrative techniques, such as dialogue and description, to develop experiences & events or show the responses of characters to situations.	Restates ideas of others accurately and adds own perspective.	VI.C2	6a
	5W3c: Use a variety of transitional words, phrases, and clauses to manage the sequence of events.	Identifies and evaluates the important features for a good product.		7b
	5W3d: Use concrete words, phrases, sensory details to convey experiences & events precisely.	Understands the basic concept of plagiarism as copying the work of others.		
	5W3e: Provide a conclusion that follows from the narrated experiences or events.	Identifies facts and details that support main ideas.		

VR Quest® STEAM Curriculum Guide
5th Grade Math

Numerical Expression



Term: a combination of constants and/or variables separated by an operation.

Algebraic Expression: a mathematical phrase that includes numbers, variables and operations

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VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into numerical expressions. As Albert Einstein so eloquently states: "pure mathematics is, in its way, the poetry of logical ideas." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of 5th grade math as you gain insight into recording calculations and creating simple expressions. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure numerical expressions as a gallery walk or an edventure learning walk. The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Some sample SMART objective players will be able to:

- Explain a numeric expression with two different order of operations, but yielding similar results within a 30 minute time period
- Determine two numeric patterns utilizing two known rules over a 45 minute period.
- Create a base ten number expression that is convertible in decimal and expanded form over a 15 minute time span.
- Compare and contrast two decimals based on place value and articulate strategies based on place value over a one class session.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of numeric expressions in our daily lives:

In daily commutes or travel for a vacation, journey or trip, a numeric expression can be created looking at distance and time. This serves to help plan an iternery by calculating time spent in a car, plane or boat. For sports enthusiasts, the height with regard to time can be expressed about a ball tossed up in the air. One of the most popular numeric expressions that also pertains to everyone is calculating the amount of money earned from work (hours spent and rate of pay).

- Determine how many times a dog walker needs to work if she makes $20 a walk and needs to earn $650 for a new bike?
- Compare and contrast two different technicians working with being paid $15 an hour working 50 hours a week and the other being paid $18 an hour working 42 hours a week.
- Define a biker's journey if she rides her motorcycle at 65 mph for 5 ½ hours.

Know the significance of art, science and technology with respect to numerical expressions:

Art, science and technology are intertwined with numerical expressions. Painters calculate the amount of paint required to cover a large canvas by how much each can yield when purchasing supplies. Scientists determine electrical components required for a project with cost per item in conjunction with how many projects they are completing.

Additionally, technology also has need for numeric expressions. In social media accounts, numeric expressions help the founders and creators determine search preferences of each user based on past searches in order to make suitable recommendations.

Explain how past practices are current are still used today:

Money has and always will be a staple in our society and lives. In the olden days, salt, gems and other things valued for being precious were used as currency. In order to better calculate money, it is important to understand decimal and place value. In numeric expressions, decimals translate into greater funds as the higher the place value goes, the quicker it translates into a whole number. Some other numerical expressions that will never change are fractional statements with regard to cooking and baking. Or planting crops from early colonial history to planting gardens and agricultural produce today.

Taking it to the next level with critical thinking:

Numerical expressions provide a solid mathematical foundation. If properly and thoroughly mastered, it will promote a solid base for algebra to be built off of. By utilizing problem solving skills, greater analysis and reflection is fostered and thus creativity is thrust forward.

- Describe two different numerical expressions you utilize in your weekly life.
- Identify a numeric expression pertaining to your T.V., computer, video game or social media usage.
- Assess data in your academic life and create a numeric expression to earmark room for improvement.
- Explain why understanding numeric expressions play such a relevant and evolving role in today's society.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of numerical expressions provides a framework for a global economy and greater growth and accomplishments for the human race. Telsa makes electric cars utilizing a strong basis of formulas. Space flights are calculated with the use of numeric expressions. Vaccines are created taking into account measurements translated into formulas.

Take time and reflect on the obstacles and problems the world needs to solve. How can mathematical computations (expressions) assist in the solutions? As you reflect on this, consider implementing these key current and historical points that use numerical expressions into your game creation.

- Assess key geographical points of different major cities using latitude and longitude. Demonstrate this through a numerical expression.
- Create a museum gallery walk of products created through the use of numerical expression contributions that have advanced technology and improved the quality of life.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.khanacademy.org/math/pre-algebra/pre-algebra-equations-expressions/pre-algebra-constructing-numeric-expressions/v/constructing-numerical-expressions-example

https://www.onlinemathlearning.com/numerical-expressions-5oa2.html

https://virtualnerd.com/common-core/grade-6/6_EE-expression-equations/A/2/2a/numerical-algebraic-expressions

https://www.tutorialspoint.com/ordering_rounding_and_order_of_operations/comparing_numerical_expression_with_number.htm

https://www.youtube.com/watch?v=FCSD8AQS27g

https://www.youtube.com/watch?v=v0bg2GWCbRo

https://www.youtube.com/watch?v=sBxOF_eCFqg

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

Math Vocabulary Word Wall

Algorithm	Array	Braces	Bracket
Coordinate	Expression	Expanded form	Formula
Graphing	Hierarchy	Mixed Number	Numerical Expression
Quadrant	Parentheses	Patterns	Rounding
Standard Form	Term	Variables	

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Explain	Explore	Express	Fluent	Generate
Identity	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method / Representation					

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:

– Did players understand the quest?

– Was all the information needed available to players?

– Did the story make sense?

– Were there things that misled players because they were unclear or inaccurate?

Interface:

– Did the interactive features work?

– Could the players navigate the landscape?

– Was the setting attractive, and in line with the theme of the quest?

– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:

– Was the quest at an appropriate level of difficulty?

– Did players stay interested in the quest?

– Were players able to complete the quest in a reasonable amount of time?

– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

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Author's Perspective		Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	5.OA.1 Apply the order of operations to evaluate numerical expressions.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	5.OA.2 Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane.		IV.C1	3c
Informational Texts		Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details	5.NBT. 1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1 10 of what it represents in the place to its left.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative		Uses various note-taking strategies. Uses common organizational patterns to organize information. Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	IV.D1	6a
Opinion	5.NBT.2 Use whole-number exponents to denote powers of 10. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.	Identifies and evaluates the important features for a good product.	II.D2	1b
Organization		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.B2	1b
Point of View		Restates ideas of others accurately and adds own perspective.	I.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Quotations				
Reasoning	5.NBT.3 Read, write, and compare decimals to thousandths. 5.NBT.3a Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. 5.NBT.4 Use place value understanding to round decimals to any place. 5.NBT.5 Fluently multiply multi-digit whole numbers using a standard algorithm.		VI.A2	3c
Sequence of Events	5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.		III.C2	6d
Audience	5.NBT.7 Using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between operations: • add and subtract decimals to hundredths; • multiply and divide decimals to hundredths. Relate the strategy to a written method and explain the reasoning used.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product.	III.B2	6a
Organization		Understands the basic concept of plagiarism as copying the work of others.		

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. 5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. 5.NF.3 Interpret a fraction as division of the numerator by the denominator (*a b* = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. 5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number or a fraction. 5.NF.4a Interpret the product *a b* × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. 5.NF.4b Find the area of a rectangle with fractional side lengths by tiling it with rectangles of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas. 5.NF.5 Interpret multiplication as scaling (resizing). 5.NF.5a Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	Drafts the presentation /product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.C2	7b

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
	5.NF.5b Explain why multiplying a given number by a fraction greater than 1 result in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case). Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number. Relate the principle of fraction equivalence $\frac{a}{b} = \frac{a \times n}{b \times n}$ to the effect of multiplying $\frac{a}{b}$ by 1.		VI.C2	7b

VR Quest® STEAM Curriculum Guide
5th Grade Social Studies

Mexico

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Social Emotional Learning is prompted as scholars are guided to consider all perspectives. How did all parties feel? Were some more privileged and have an advantage over others? How do issues of power, wealth and morality influence exploration and colonization? Could the United States have shown more empathy or compassion in dealing with other countries or groups of people? If you were given a chance to lead, what would you do differently? Why is it important to always consider the human side of the equation? How can we right the wrongs of the past?

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

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As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into history. As the adage so eloquently states: "in order to guide your future you must understand your past."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through Mexican landscapes and gain insight into the responsibilities people have during periods of growth and globalization. Many have been fascinated by Mexico's rich culture, diverse geography and multilayered economy for centuries.

As you recreate an authentic geographic region, think about ways to insert your thoughts, opinions and ideas on how many situations were handled. How could interactions have been more fair or compassionate? How do issues of power, wealth and morality influence exploration and colonization?

In this quest, you create an edventure in the unique environment of Mexico's diverse and beautiful country. The graphic on the following page outlines the basic steps involved in creating your learning VR Quest®. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01

Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific

Measurable

Attainable

Realistic

Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Investigate how various European powers explored and eventually colonized the Western Hemisphere.
- Compare and contrast the United States to Mexico with a focus on culture, geography, government and economics.
- Explain how diverse geography of the Western Hemisphere influenced human culture and settlement in distinct ways.
- Define how human communities in the Western Hemisphere have modified the physical environment.

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk. Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02 Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Critique a comparative case study of Western Hemisphere Cultures:
The countries of the Western Hemisphere are diverse, and the cultures of these countries are varied and rich. Because the United States and Mexico's proximity to each other, they share some of the same concerns and issues.

Mexican architecture and communities illustrate an astounding level of engineering. Mexico has the greatest number of declared World Heritage sites in all the Americas. They are of artistic and historical significance as exemplified by the archeological finds of the Mesoamerican civilizations. While some structures were very simple, others were quite complex. Early churches and monasteries were built on classical Arabic and Spanish principles.

- Describe the geographic features (regions, states, rivers, mountains, deserts, landforms, oceans, seas and gulfs).
- What different regional characteristics (physical, political, economic or cultural features) are there?
- Define how physical environment influences human settlement, land use and economic activity.
- Explain their religion, beliefs and cultural contributions.
- Compare and contrast the United States' to Mexico's key cultural characteristics: sports, leisure activities, music, dance, literature, traditions, arts, language and architecture.

Know the significance of math and science throughout everyday life:
Mathematics and art were hand-in-hand as an important part of Mexican life. This can be illustrated by their pyramids, cathedrals and government buildings. The structures, symmetry and strategic placements of columns, arches and openings are mathematically and artistically based. The cultural dances, music and storytelling traditions are based in sequences, repetitions, and timing.

Additionally, the Mexican art of paper cutting is based on patterns and math skills. Math and art are pre-dominate features in everyday Mexican life.

Explain the past and current economy:
The people of the Western Hemispheres have developed various ways to meet their wants and needs. They may trade with each other, as well as other countries around the world. Determine the characteristics of traditional, market and command economic systems, imports from and to other Western Hemisphere markets and define the free market economy. Define NAFTA. Assess the major natural resources and industries of Mexico with specific reference to regional production and manufacturing.

Social emotional learning:
How do issues of power, wealth and morality influence exploration and colonization? How did it affect all those involved as well as subsequent generations? To what degree did the Western Hemisphere hinder equality and Civil Rights? Please make sure to support any opinions you form with text evidence so the person who plays your game understands how you came to the conclusions you did.

Taking it to the next level with critical thinking:
How do key forces and events shape nations? Mexico shared traditions with Western Hemisphere nations that affected its growth and transformation. Various regions developed differently because of their interactions and often struggled for equality and civil rights or sovereignty. In addition, the political systems of the Western Hemisphere vary in organization and structure across time and place.

- Independence from Spain (1821)
- The Alamo and San Jacinto
- Mexican-American War
- Battle of Puebla (1862) and Cinco de Mayo
- Mexican Revolution (1910)
- Political Constitution of the United Mexican States (1917)
- Indigenous Rights
- Women's Rights
- Multinational and Nongovernmental organizations: United Nations, World Bank, Project Hope, local maize vs GMO corn, The Nature Conservancy

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Mexico gives you a wealth of opportunities and challenges to design a quest where players discover more about this amazing country as they face and overcome obstacles and problem solve. Here are a few ideas:

- Tell players that they are the architects of Mexican pyramids and are being pursued for their blueprints. They need to know different geography terrains and location to avoid encounters with unknown entities that are trying to destroy the blueprints. Creators can alter structures by changing aspects of the physical environment.
- Challenge players to create a detailed cultural Mexican museum. What does each object represent and what is its significance?
- Explore a pyramid to find artifacts within and create a portfolio capturing the historical content. What other artifacts would you add from different time periods and why?

Websites for Student Use

Here are a few vetted websites to help you conduct research:

http://softschools.com/facts/cultures/mexican_culture_facts/2378/

https://educ5428.wordpress.com/culture-community/cultural-norms-beliefs-and-values/

https://www.thoughtco.com/famous-people-in-mexican-history-2136677

https://historyplex.com/mexican-family-culture-values-traditions-beliefs

https://kids.britannica.com/students/article/Mexico/275813

https://www.kids-world-travel-guide.com/mexico-facts.html

https://kids.nationalgeographic.com/explore/countries/mexico/#mexico-dancers.jpg

https://www.ducksters.com/geography/country/mexico.php

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses all they've learned during the course of VR Quest® to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following pages is a sample storyboard for a Mexican VR Quest®.

This illustration highlights different Mexican regions.

Sample Storyboard for Mexico VR Quest®

Introduction Panels 1 and 2

1. A native guide will lead the player through a narrow mountainous path toward an Inca community.

2. Player comes to several structures that illustrate family life and community. Narrate your journey as you travel.

Body Panels 3-10

3. Player searches for cultural artifacts within community to create a journal documenting his/her journey.

4. Player recognizes how advanced in science and tech Mexicans (Maya civilization) were with highly advanced writing systems, calendars, math, architecture and astronomical systems.

5. The dead fish supplied the nutrients for the plants while the beans grew close to the ground and kept much-needed moisture in the soil.

6. Player moves through the beans which also acted as a natural deterrent to maize pests. These individual plantings were built on little mounds with indentions on top to collect rainwater.

7. Young guide states, *"We are an amazing community or a growing and advanced civilization. Our government, buildings and culture have transcended time and we are often visited in the modern age."* Contributions to society and the world will be detailed here with audio and visuals.

8. Voice: *"Art and science was part of everyday life for us – It was used for more than just decorations and common household objects."* Detail some important pieces.

9. Player walks around the perimeter of the community taking note of all daily activities and nodding in appreciation.

10. Player returns to the center of the community and greets the most revered and the oldest leaders.

Climax

11. Player needs the most important artifacts to present to the elders. *"Oh no! I don't have the most important artifact from my journey. What will I do?"*

Summary

12. Teamwork *"Congratulations, my friend. You found it. Great job!!"*

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 – 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

For example, the above Diego Rivera work of art highlights the political tensions and the battle for justice and equality that everyday people fought for. Different artifacts can illustrate what daily life was like or even provide benchmarks for participants to begin to compare/contrast Mexico and the United States.

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 – 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Analyzing Comparing Contrasting Evidence Information Text Reasoning Summarizing Questioning Quotation Categorization Dialogue Domain Specific Vocabulary Explanatory Text Facts Graphics Illustrations Informational Text	W.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information. a. Introduce a topic or text clearly, state an opinion and create an organizational structure in which ideas are logically grouped to support the writer's purpose. b. Provide logically ordered reasons that are supported by facts and details. c. Link opinions and reasons using words, phrases and clauses (e.g., consequently, specifically). d. Provide a concluding statement or section related to the opinion presented. W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic clearly, provide a general observation and focus and group related information logically; include formatting (e.g., headings), illustrations and multimedia when useful to aiding comprehension. b. Develop the topic with facts, definitions, concrete details, quotations or other information and examples related to the topic, information or explanation presented.	Analyzes and evaluates what is known, observed or experienced to form tentative thesis or hypothesis. States and verifies what is known about the problem or question and makes connections to prior knowledge. Writes questions independently based on key ideas or areas of focus. Determines what resources will most likely offer quality information. Considers culturally divergent and opposing viewpoints on topics. Uses the categorization of materials within Dewey areas to locate resources and browse for additional materials. Uses technology resources such as online encyclopedias, online databases, and Web subject directories to locate information on assigned curriculum topics. Uses organizational systems and electronic search strategies - key words, subject headings) to locate appropriate resources. Uses multiple sources to acquire background information and brainstorms ideas for further inquiry. Questions the differences between sources and seeks additional sources to resolve. Evaluates and paraphrases information that answers research questions.	1.A1 1.A2 IV.A1 II.A2 IV.A1 IV.A2 IV.A1 II.A2 V.A1 I.D1 III.B1 IV.B1 IV.B4 III.B2 II.B3 IV.C1 I.C1	6c 4c 6a 3a 3b 5c 5c 1a 1b 3c 6d 3a 4b 5b 1b 4c 3d

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Key Details Multimedia Narrative Opinion Organization Purpose Point of View Quotation Sequence of Events Point of View Investigating Constructing Assessing Differentiating Formulating Critique	W.5.3. Write narratives to develop real or imagined experiences or events using effective technique, descriptive details and clear event sequences. a. Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally. b. Use narrative techniques, such as dialogue, description and pacing to develop experiences and events or show the responses of characters to situations. W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose and audience. a. Produce text (print or nonprint) that explores a variety of cultures and perspectives. W.5.5. With guidance and support from peers and adults, develop and strength writing as needed, revising, editing, rewriting or trying a new approach. W.5.6. With some guidance and support from adults, use technology, including the internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting. W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. W.5.8 Draw evidence from literary or informational texts to support analysis, reflection and research.	Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy. Uses both facts and opinions responsibly by identifying and verifying them. Takes notes by paraphrasing or using quotation marks when using someone else's words. Interprets information and ideas by defining, classifying, and inferring. Uses common organizational patterns to organize information in order to draw conclusions. Forms opinions and judgments backed up by supporting evidence. Publish final product for a particular audience and purpose. Interprets information and ideas by defining, classifying, and inferring. Considers culturally divergent and opposing viewpoints on topics. Cites all sources used according to local style formats. Uses interactive multimedia tools to exchange data collected and to learn curricular concepts by communicating with peers, experts and other audiences. Writes questions independently based on key ideas or areas of focus. Uses table of contents, index, chapter and section headings, topic sentences and summary sentences to locate information and select main ideas. Uses the structure and navigation tools of a website to find the most relevant information. Takes notes by paraphrasing or using quotation marks when using someone else's words.	VI.B2 VI.B3 II.B2 III.B2 I.B3 VI.C1 VI.C2 III.B1 II.B3 I.C3 I.D1 IV.D1 II.D1 IV.D1 I.D1 I.D4 VI.D1 V.B1	4a 4d 6d 3b 3a 4a 6d 6b 6a 2c 3b 3d 5c 1b 1d 2b 2c 7 6d 6d

VR Quest® STEAM Curriculum Guide
6th Grade English

D'Aulaires Book of Greek Myths

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

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Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

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As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with the fictional work, D'Aulaire Book of Greek Myths. As a adage of eloquently states: "Reading open the door to unlimited knowledge."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of Greek gods and goddesses as you gain insight into customs, morals, ancient stories and the relevance of the myths to today's world. As you begin to develop questions about these stories, history and their enduring legacy, you will be able to explain how Greek myths continue to shape the world we live and all disciplines in other academic areas as well.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

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Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of Greek myths with respect to warnings, morals and philosophies in a 45 minutes time span
- Determine the importance of highlighting flaws of Greek gods and goddesses within 30 minutes
- Explain how Greek myths have contribute to classic and modern literature from the time periods 1800-2020
- Compare and contrast references of Greek mythology in today's world and modern phrases taken from Greek myths in 45 minutes

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

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03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the legacy of Greek myths in American culture:
Though created thousands of years ago, Greek myths are important in American culture. Myths, similar to folk tales and legends, are passed down over generations. Acclaimed as epic stories, the Greek myths have been immortalized by heroic deeds, gods, goddesses and mythical creatures. Typically, the myths teach right from wrong, a lesson and also the importance of courage, intelligence and being true to your word. It is not unusual for modern scholars to study Greek myths in order to better understand civilization, religious and political entities. As Greeks viewed myths as stories with a purpose and passion, they were written to assist in shaping how people thought, lived and conducted themselves among others.

- How did Aristole and Sophocles help weave Greek myths to affect outcomes for the greater good and mankind? How did their culture, personal beliefs, family relationships and environment play into Greek myth development?
- Compare and contrast two different characters in two different myths? How are they similar and how are they different? Do they have tragic flaws and if so, what is it?
- Determine why the myths showed incredible greatness of the main characters while also highlighting tragic flaws or weaknesses.
- Define the multiple avenues in which the Greek myths affected literature, theater and the arts in the world outside of Greece.

Know the significance of art, science and technology throughout the mathematical history:
Greek myths are all encompassing. Their very existence has greatly influenced the arts, math, science and eventually technology as well. The Greek myths have inspired countless artists in paintings, sculptures, drawings and other renditions. For example, Picasso used a representation of a minotaur to be an aging artist and created an analogy of darkness and the inner demons of selfhood and sexuality. And in the 19th century, many artists, as well as writers, used mythology to showcase homoerotic desires.

The Greek myths have kept art fluid, focused and present throughout the ages as a retelling of metamorphoses. Additionally, Greece was know for having the most critical thinkers. As such, the myths helped to fostered Greek thought pertaining to the math and sciences.

Specifically, the philosophies present throughout the myths elicit relationships of old Greek beliefs and their truths and theories. Technology, having roots in science and math, has been an offshoot of the Greek myths.

Explain how past practices are current and still used today:
Greek myths serve many purposes in society. Not only do myths help answer perpetual questions children ask, but they also provide a foundation justifying existing social structures and systems as they account for customs and rites of tradition. While not directly introducing the different gods and goddesses the way main characters are usually done in fiction stories, the myths gradually have plots unfold as they present human and divine conflicts or problems needing to be addressed. While myths might seem a thing of the past, they are present in many ways in today's culture. The sneaker company, Nike, is named after the goddess of victory. The mega store, Amazon, takes it name from the mythical female warriors that were strong beyond compare. Further, some phrases are still rooted in American culture like Pandora's box or Achilles' heel.

Taking it to the next level with critical thinking:
Greek myths have greatly contributed to both classic and modern literature. The plots are exciting. The characters are dimensional and figuring out solutions to some of the dilemmas foster greater reflection and problem solving. The myths provide a framework of deeper meanings in life. They detail the bravery of ordinary people, the importance and wisdom of rules and the eternal journey of human beings to try to surpass the gods. Understanding the foundation of the Greek myths help readers to better grasp history, their past and the possibility of an unlimited future.

One of the key messages embedded in the myths is mankind can become equal to the gods if they are honorable, live heroically and exhibit courage while facing dangerous challenges.

- Identify and describe two different heroes from two separate works. What did they do in times of difficulty? What character traits did they exhibit? Provide examples. What was their relationship with their environment?
- Assess how the Greek myths inspired the future. Mythical creatures flew in the air. The Greeks provided a framework for chemistry, astrology, math and physics. While today's scientists display skepticism at obtaining ideas from the myths, the Greek myths did encourage engineers to experiment with humans flying today.
- Explain how human beings challenged the superiority of the gods. What were the charitable deeds of the Greek heroes?

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of the Greek myths with respect to environment and sustainability provides a wealth of opportunities and challenges to design a quest where players discover better practices for living in tune with Mother Earth. The Greeks believed all natural forces like wind, air, water, fire were controlled by the gods. As such, the myths go to great lengths to illustrate nature as full of force or very deadly. So humans were taught to preserve nature and live kindly and compassionately so that they always treated Mother Earth with humility and respect. With the introduction of humans, it is noted that hardship, pain and suffering were inadvertently introduced.

- Tell players to utilize various globes, maps and documents to show the location of different natural disasters. Create a timeline of these and align it to gods, goddesses or myths that is best parallel to the disaster. What affect did these natural phenomenons have immediately and in the future?
- Geographic locations / places and political / religious conditions influence everyday people. Create MP3 files through audacity indicating how different regions in the world might view and apply the Greek myths differently.
- Create a museum gallery walk of the different gods and goddesses. Highlight three character traits and support the traits with examples. Be prepared to discuss connections you make to these gods and goddesses. Good readers and writers make connections. The three types of connections you can make are text to text, text to world or text to self.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.britannica.com/topic/Greek-mythology

https://www.history.com/topics/ancient-history/greek-mythology

https://www.natgeokids.com/uk/discover/history/greece/greek-myths/

https://www.greekmythology.com/

https://greekgodsandgoddesses.net/myths/

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitve Accountable Talk Extension Stems

Based on the evidence . . .

The key information indicates / identifies / explains . . .

This reminds me of . . .

This is relevant because . . .

In summary, this means . . .

To expand / piggyback off of what _____ said . . .

I infer this represents . . .

I used to think _____, but now _____

What's important here is . . .

It's interesting that . . .

One thing we should notice is . . .

One thing we haven't considered is . . .

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

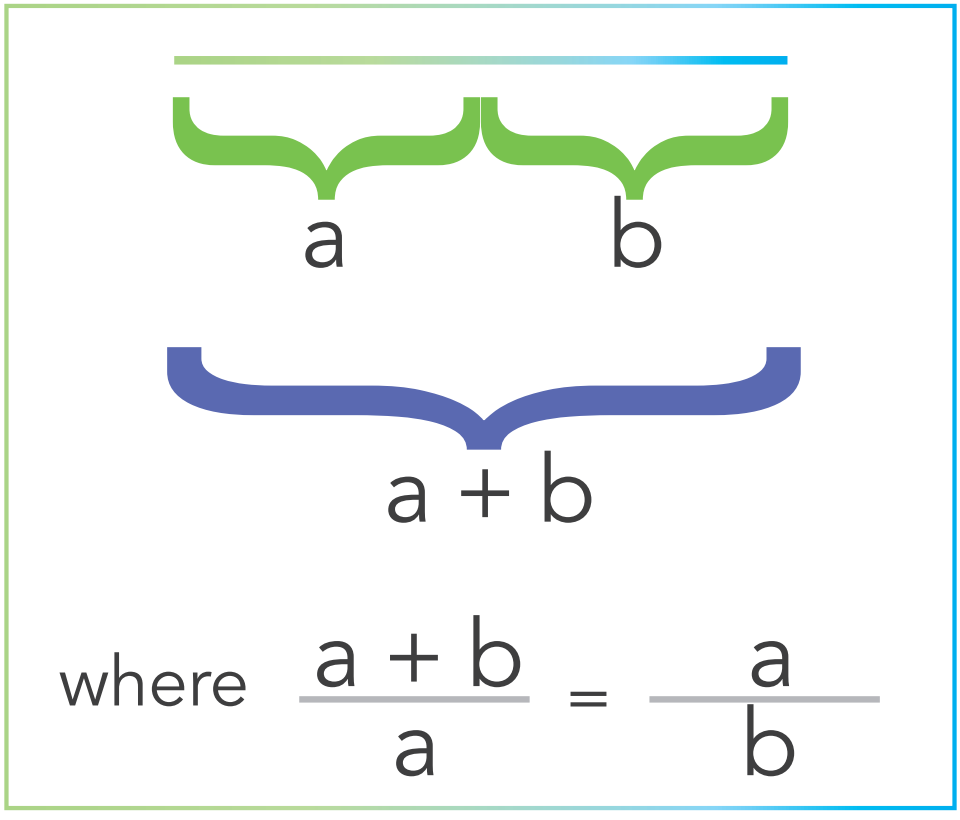
DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	6R1: Cite textual evidence to support an analysis of what the text says explicitly/ implicitly and make logical inferences.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.		
Domain Specific Vocabulary	6R2: Determine a theme or central idea of a text and how it is developed by key supporting details over the course of a text; summarize a text	Distinguishes between fact and opinion.	I.A1	3d
Explanatory Texts	6R3: In literary texts, describe how events unfold, as well as how characters respond or change as the plot moves toward a resolution. In informational texts, analyze how individuals, events, and ideas are introduced, relate to each other, and are developed.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	V.A2 I.D1	1b 3d
Facts	6R4: Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings. Analyze the impact of specific word choices on meaning, tone, and mood, including words with multiple meanings.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1 IV.C1	5c 3c
Illustrations		Uses pre-selected Web resources to locate information.	V.A1	
Informational Texts	6R5: In literary texts, analyze how a particular sentence, paragraph, stanza, chapter, scene, or section fits into the overall structure of a text and how it contributes to the development of theme, central idea, setting, or plot. In informational texts, analyze how a particular sentence, paragraph, chapter, or section fits into the overall structure of a text and how it contributes to the development of theme or central ideas.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions. Uses various note-taking strategies.	III.B1	2b

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Key Details	6R6: In literary texts, identify the point of view and explain how it is developed and conveys meaning. In informational texts, explain how an author's geographic location or culture affects his or her perspective.	Uses common organizational patterns to organize information. Uses pre-writing to brainstorm ideas for most effective way to present conclusions.		
Narrative	6R7: Compare and contrast how different formats, including print and digital media, contribute to the understanding of a subject.	Identifies and evaluates the important features for a good product.	IV.D1	3d
Opinion	6R8: Trace and evaluate the development of an argument and specific claims in texts, distinguishing claims that are supported by reasons and relevant evidence from claims that are not.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	II.D2	6a
	6R9: Use established criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences.		I.B2	1b
Organization	6W2a: Introduce a topic clearly; organize ideas, concepts, and information using strategies such as definition, classification, comparison/contrast, and cause/effect.	Restates ideas of others accurately and adds own perspective. Paraphrases and summarizes information that answers research questions.	I.A2	1b
			VI.A2	3c
Point of View	6W2b: Develop a topic with relevant facts, definitions, concrete details, quotations, or other information and examples; include formatting, graphics, and multimedia when useful to aid comprehension.	Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product.		
Quotations				

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning	6W2c: Use precise language and content-specific vocabulary to explain a topic. 6W2d: Use appropriate transitions to create cohesion and clarify the relationships among ideas and concepts. 6W2e: Provide a concluding statement or section that explains the significance of the information presented.	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance Asks questions to clarify topics or details.		
Sequence of Events	6W2f: Establish and maintain a style appropriate to the writing task. 6W3a: Engage the reader by introducing a narrator and/or characters.	Understands the concept of "audience;" determines audience before creating product.	III.C2	3c
Audience	6W3b: Use narrative techniques, such as dialogue and description, to develop experiences, events, and/or characters.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	III.B2	6d
Organization	6W3c: Use a variety of transitional words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another.	Restates ideas of others accurately and adds own perspective.	VI.C2	6a 7b
Purpose	6W3d: Use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events. 6W3e: Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.		

VR Quest® STEAM Curriculum Guide
6th Grade Math

Ratios



Hamilton Buhl
Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into ratios and understanding the different perspectives in math. As the adage so accurately states: "Life is a math equation. In order to gain the most, you have to know how to convert negatives into positives. As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of ratios as you gain insight into relationships. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure ratios or a learning walk. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain two different equations of ratios that make up a $1 within a 10 minute time period
- Determine how ratios can applied during a 35 minute lunch span
- Create a fractional equation to the number of boys and girls in a classroom during a 40 minute period
- Compare and contrast two varied ratios and articulate their differences within a three minute time span

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of ratios in our daily lives:

Ratios, proportions or fractions are all around us. They are a large part of our lives. Think of food and serving your family and guests. A pizza pie or an apple pie are cut into different ratios or fractions. First it is cut in half, then quarters, then eighths. Or a dollar or a $100 bill can be divided into various ratios or equal proportions. Ratios are all around us and it is something we fluidly and readily use during the course of a normal day.

- Determine the significance of proportions / ratios in the design of the Empire State Building?
- Compare and contrast two different ratios for the same area or perimeter.
- What observations and assumptions do you make and why?
- Define everyday implications for the use of ratios in sports, cooking and other hobbies.

Know the significance of art, science and technology throughout the history of ratios:

If you venture into any museum, you will see paintings, sculptures and other art forms. Look closely and you will see that art is based within proportions. The term Golden Ratio (also known as Golden Mean, Golden Section, Golden Number or Golden Proportion / Divine Proportion) is often used to describe the aesthetically pleasing manner in which a piece of art is made. This ratio of 1 to 1.618 is commonly found in nature and based in rectangular art that pleases the human eye. This also appears in architecture, music and patterns within the human body. It is seen in the scientific construction of the pyramids built by Egyptians, as well as when the ancient Greeks built the Parthenon.

In the famous painting, The Last Supper by Leonardo da Vinci, it was used. Additionally, ratios are prevalent in science as best demonstrated in chemistry and physics. Without having the right proportions in a chemical experiment, you might produce a deadly reaction. In technology, ratios are present in construction of parts, makeup of devices and even down to the tiny pins on internal hard drives, there are specific ratios used.

Explain how past practices are current and still used today:

Historically, back in 300 B.C. Euclid wrote Euclid's Elements, a mathematical treatise comprised of 13 books of mathematical theorems, definitions, proofs, etc. In it, he describes the golden section, which focuses on ratios used for many important places, concepts and things. Prior to that, Pythagoras around 500 B.C. established the premise of the Golden Ratio as the basis for human figure proportions.

Taking it to the next level with critical thinking:

Ratios or proportions are still a very large part of our existence and very relevant for our future. It is something used for more than just a math class or passing a test. Think about work that is being done to not only send rovers to Mars, but possible citizens to the moon. Consider the development of a Covid 19 vaccine or even constructing a new steel bridge that spans four miles. All of these depend on specific proportions in order to be successfully established or implemented.

- Identify a landmark structure and define the proportions or ratios used in its form.
- Assess different contact points of the landmark and determine if changes were made to the proportions how it would affect the feasibility of its structure.
- Explain how to alter the landmark's ratios without changing its durability.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of ratio with respect to our environment and sustainability provides a wealth of opportunities and challenges to design a quest where player focus on eco friendly design and practices, as well as lay a foundation of establishing positive life long habits of caring for our planet. Here are a few ideas:

- Research the Green Plot Ratio, which is a scientific ratio based on determining the appropriate amount of plant coverage necessary for building sustainability in urban design.
- Consider how geographic features and political conditions influence the Green Plot Ratio. Why is it important to have biodiversity in cities? (Think energy consumption, resources and pollution.) How does it help improve the quality of life? (Think heat islands, health, air quality, well being.) How does it maximize the potential of green space without neglecting the vision or utility of a building project?
- Create a museum gallery walk of different significant ratios in history and implications if these had not been used.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.mathgames.com/skill/6.63-ratios

https://www.mathgames.com/grade6

https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-ratios-prop-topic

https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-ratios-intro/e/representing-ratios

https://www.youtube.com/watch?v=t8MevmXRoZ4

https://www.youtube.com/watch?v=puku5vUCOcE

Student Voice and Empowerment

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7.	8.	9.
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Math Vocabulary Word Wall

Algorithm	Array	Braces	Bracket
Coordinate	Expression	Expanded form	Formula
Graphing	Hierarchy	Mixed Number	Numerical Expression
Quadrant	Parentheses	Patterns	Rounding
Standard Form	Term	Variables	

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Explain	Explore	Express	Fluent	Generate
Identity	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method / Representation					

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

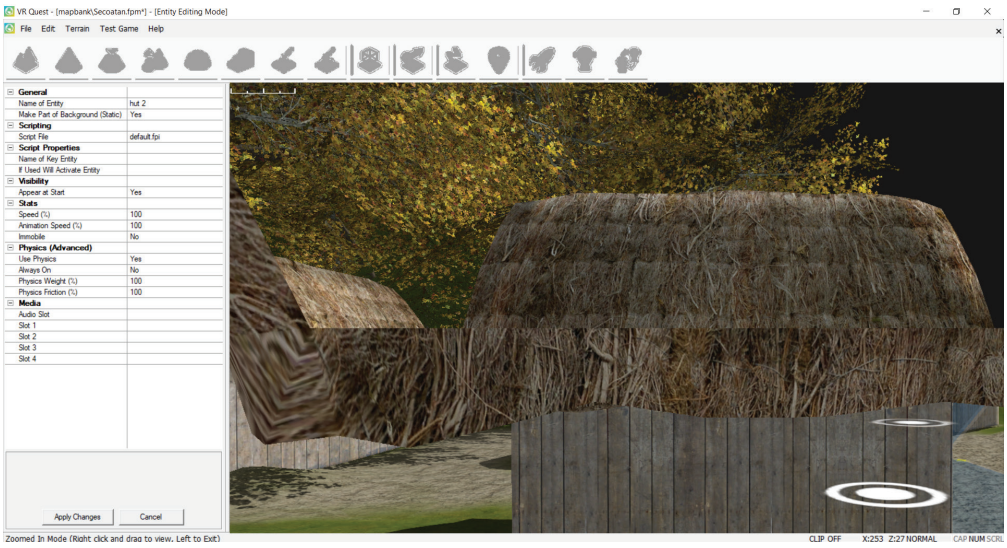
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
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– Was the quest at an appropriate level of difficulty?
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In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective		Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	5.OA.1 Apply the order of operations to evaluate numerical expressions.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	5.OA.2 Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane.		IV.C1	3c
Informational Texts		Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details	5.NBT. 1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1 10 of what it represents in the place to its left.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative		Uses various note-taking strategies. Uses common organizational patterns to organize information.	IV.D1	6a
Opinion	5.NBT.2 Use whole-number exponents to denote powers of 10. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions. Identifies and evaluates the important features for a good product.	II.D2	1b
Organization		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.B2	1b
Point of View		Restates ideas of others accurately and adds own perspective.	I.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Quotations **Reasoning** **Sequence of Events** **Audience** **Organization**	5.NBT.3 Read, write, and compare decimals to thousandths. 5.NBT.3a Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. 5.NBT.4 Use place value understanding to round decimals to any place. 5.NBT.5 Fluently multiply multi-digit whole numbers using a standard algorithm. 5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 5.NBT.7 Using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between operations: • add and subtract decimals to hundredths; • multiply and divide decimals to hundredths. Relate the strategy to a written method and explain the reasoning used.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others.	VI.A2 III.C2 III.B2	3c 6d 6a

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. 5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. 5.NF.3 Interpret a fraction as division of the numerator by the denominator (*a b* = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. 5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number or a fraction. 5.NF.4a Interpret the product *a b* × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. 5.NF.4b Find the area of a rectangle with fractional side lengths by tiling it with rectangles of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas. 5.NF.5 Interpret multiplication as scaling (resizing). 5.NF.5a Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	Drafts the presentation /product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.C2	7b

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
	5.NF.5b Explain why multiplying a given number by a fraction greater than 1 result in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case). Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number. Relate the principle of fraction equivalence $\frac{a}{b} = \frac{a \times n}{b \times n}$ to the effect of multiplying $\frac{a}{b}$ by 1.		VI.C2	7b

VR Quest® STEAM Curriculum Guide
6th Grade Social Studies

Byzantine Empire

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars are guided to consider all perspectives. How did all parties feel? Were some more privileged and have an advantage over others? How do issues of power, wealth and morality influence exploration and colonization? Could the United States have shown more empathy or compassion in dealing with other countries or groups of people? If you were given a chance to lead, what would you do differently? Why is it important to always consider the human side of the equation? How can we right the wrongs of the past?

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into history. As the adage so eloquently states: "in order to guide your future you must understand your past."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the Mediterranean World and gain insight into the interactions across the Eastern Hemisphere. Many have been fascinated by the Byzantine Empire for centuries. As you recreate an authentic geographic representation using a variety of maps, globes, aerial and satellite photographs and computer models, think about ways to insert your thoughts, opinions and ideas on how many situations were handled.

Major religions and belief systems were developed in the Eastern Hemisphere. There were important similarities and differences between these belief systems. What role did the belief systems play in a society? How can power, wealth and religion influence change and development?

In this quest, you create an adventure in the unique environment of the Mediterranean World. The following graphic outlines the basic steps involved in creating your learning VR Quest®. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Determine preserved elements of the Roman Empire.
- Investigate cultural blending and cross-cultural exchange. Define blending of Roman traditions with Greek culture.
- Assess the role of the Christian Church (ca. 600C.E. – ca. 1450).
- Compare and contrast different perspectives on the Crusades: Byzantine, feudal Europe and Islamic.
- Explain how trade networks promoted the exchange and diffusion of language, belief systems, tools, intellectual ideas, inventions and diseases.

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02 Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the fall of Rome:
With the fall of Rome, the Mediterranean world was reshaped. There was discord and many civil wars.

Three distinct cultural regions developed: feudal Western Europe, the Byzantine Empire and the Islamic caliphates since these regions interacted with each other and clashed over control of holy lands. They were all very distinct and culturally rich. All these human communities adapted or modified the physical environment.

There were a variety of significant geographic features: the highest mountains, the deepest ocean trench, deepest lake, largest deserts, most islands, largest country, tallest buildings and most populous cities. The area was characterized by vast oceans, important bodies of water and land masses, as well as extremes in climate (sub-tropical vs. artic, droughts vs. monsoons).

The political, economic, military and social interactions among regions were all very different and illustrate an astounding level of sophistication. Additionally, trade networks promoted the exchange and diffusion of language, belief systems, tools, intellectual ideas, inventions and diseases.

- What were the effects of conquests?
- What were the causes and effects of The Crusades?
- Determine the growth and development of the Islamic World (Middle East, Iberian Peninsula, Indian subcontinent, Southwest Asia, North and Central Africa, Islands of Indonesia).
- Describe the patterns in human settlement, economic activity, natural resources, resource extraction and resource allocation vs. scarcity of resources in present day.
- Map the trade routes and compare and contrast the major Afro-Eurasian trade networks (The Silk Roads, Mediterranean, Indian Ocean and Trans-Saharan routes).

Know the significance of math and science throughout the Mediterranean World:

Mathematics was present in everyday life. It can be seen in the trade system and tools that were used. Record-keeping was very defined and advanced for civilizations at the time.

Examine what role math played in the Byzantine Empire. There was considerable seismic activity in the eastern Mediterranean, as well as the Ring of Fire. The geologic history (plate tectonics, the creation of continents, development of landforms, the elevation of the Himalayas) was specific to the area and illustrate various changes the earth went through.

Additionally, Byzantine science and technology played a major role in building knowledge bases and empowering Islamic science and later Renaissance Italy. Byzantine inventors synchronized clocks, as well as refined a Greek combustible fire used in battles.

Explain how past practices are current and still used today:

Explore and define different types of ideologies and political systems at various locations and times in the Eastern Hemisphere. Identify the roles of individuals and key groups in those social and political systems.

Determine connections between East and West Genghis Khan and/or Kublai Khan The Golden Horde and the Yuan Dynasty. Both historically and currently, describing the roles of people in power in the Eastern Hemisphere. Determine ways that current figures can influence people's freedom and rights.

Taking it to the next level with critical thinking:

Physical environment influenced human activities and development in the Eastern Hemisphere. Important individuals, groups and institutions shared a long and diverse history. Resource locations influenced trade routes and economics. Examine some topics below:

- Cultural diffusion (Indian/Arabic numerals, mapmaking, printing, china, tea, opium, spices, Swahili, paper, silk and Buddhism)
- Interregional travelers and explorers (Marco Polo, Ibn Battuta, Mansa Musa and Zheng He)
- Development of transportation and technology and the effect on trade (junks, Caravels, ship sails and rudders, compass and astrolabe, gunpowder)
- Epidemics and pandemics (Black Death – Bubonic Plague, typhus, cholera, smallpox)

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The Mediterranean World and the Byzantine Empire gives you a wealth of opportunities and challenges to design a quest where players discover more about this amazing civilization as they face and overcome obstacles and problem solve. Here are a few ideas:

- Tell players to reshape the Mediterranean World after the fall of the Roman Empire by including overexpansion, corruption and invasions.
- Challenge players to create a detailed museum walk of the Islamic Golden Age or the Byzantine Empire by including cultural (art, music, literature, language and architecture) artifacts.
- Explore the controlled lands within the Mediterranean Basin and highlight the blending of Roman traditions with Greek culture.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://kids.kiddle.co/Byzantine_Empire

www.historyforkids.net/byzantine-empire.html

http://academickids.com/encyclopedia/index.php/Byzantine_Empire

https://study.com/academy/lesson/byzantine-empire-lesson-for-kids-geography-government.html

https://www.ducksters.com/history/islam/

https://kids.kiddle.co/Islamic_Golden_Age

https://rome.mrdonn.org/fall.html

https://www.youtube.com/watch?v=IBKKTgwPufE

https://kidskonnect.com/history/roman-empire/

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

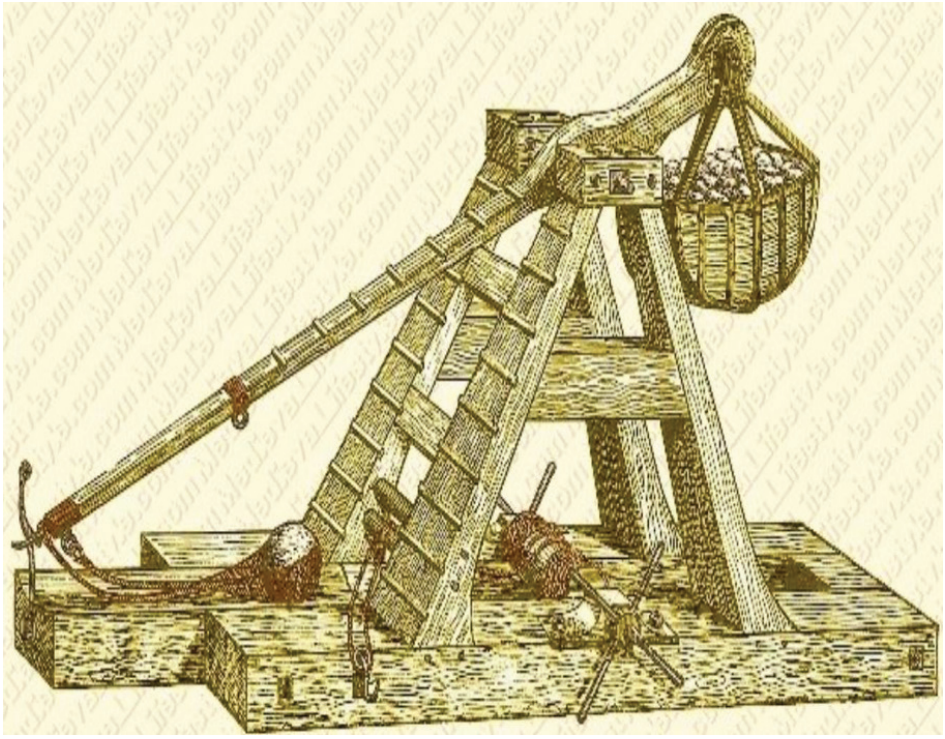
Climax
A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire VR Quest®.

This illustration highlights advanced Byzantine technology.



Sample Storyboard VR Quest®

Introduction Panels 1 and 2

1. Player will guide the user through different geographic features of the Eastern Hemisphere showing extremes in climates.

2. Player comes to a political structure and discusses the effects of geography on political systems.

Body Panels 3-10

3. Player must find cultural artifacts within the Byzantine Empire and the Islamic World to compare and contrast.

4. Player recognizes how advanced in science and technology the Byzantine Empire was specifically with Greek fire and synchronized clocks that sent messages across Asia Minor.

5. Player moves through town and discusses the economic systems (use of resources and land, cities, job specialization, slavery).

6. Player passes different physical structures and details social hierarchy and the government (political systems).

7. Young guide will recognize and explain how characteristics (cultural, economic and physical environmental) of regions affect the history of societies in the Eastern Hemisphere.

8. Voice: *"As citizens within societies within the Eastern Hemisphere, we have rights and responsibilities so that all runs smoothly."*

9. Player walks around the perimeter of the area and summarizes all the cultural and political achievements' influence on contemporary societies.

10. Player returns to the center of the village and greets elders.

Climax

11. Player needs the most important artifacts to present to the elders. *"Oh no! I don't have the most important artifact from my journey. What will I do?"*

Summary

12. Teamwork *"Congratulations, my friend. You found it. Great job!!"*

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 – 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

For example, this Byzantine artifact shows the use of gold leaf with a religious or devotional image. It was not uncommon to see ivory or enamel used as well.

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
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Curricular Alignment

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Argument Cause/ Effect Claims Classification Comparing Contrasting Counterclaims Dialogue Domain Specific Vocabulary Evidence Explanatory Text Facts Graphics Key Details Informational Text Main Topic	6.6a Examine reasons for the fall of the Roman Empire and the development of feudalism in Western Europe, including efforts to restore the empire, the decentralization of political authority, and the role of the Christian Church in providing some measure of central authority. 6.6b Examine how the Byzantine Empire preserved elements of the Roman Empire by blending Roman traditions with Greek culture, and developed a Christian faith, known as Orthodox Christianity, which united Church and state authority in the person of the emperor. 6.6c Examine the Umayyad and Abbasid caliphates, noting how the introduction of Islam changed the societies and cultures each conquered, blending with those societies and cultures and creating dynamic new Islamic societies and cultures.	States and verifies what is known about the problem or question and makes connections to prior knowledge. Writes questions independently based on key ideas or areas of focus.	1.A2 IV.A1	4c 6a
		Analyzes and evaluates what is known, observed or experienced to form tentative thesis or hypothesis.	II.A2	3a
		Determines what resources will most likely offer quality information.	IV.A1	3b
		Considers culturally divergent and opposing viewpoints on topics.	IV.A2	5c
		Uses the categorization of materials within Dewey areas to locate resources and browse for additional materials.	IV.A1	5c
		Uses technology resources such as online encyclopedias, online databases, and Web subject directories to locate information on assigned curriculum topics.	II.A2	1a
		Uses organizational systems and electronic search strategies (key words, subject headings) to locate appropriate resources.	V.A1	1b
		Uses multiple sources to acquire background information and brainstorms ideas for further inquiry.	I.D1	3c
		Questions the differences between sources and seeks additional sources to resolve.	III.B1	6d
		Evaluates and paraphrases information that answers research questions.	IV.B1	3a
		Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.	IV.B4	4b
		Uses both facts and opinions responsibly by identifying and verifying them.	II.B3	5b
		Takes notes by paraphrasing or using quotation marks when using someone else's words.	III.B1	4a

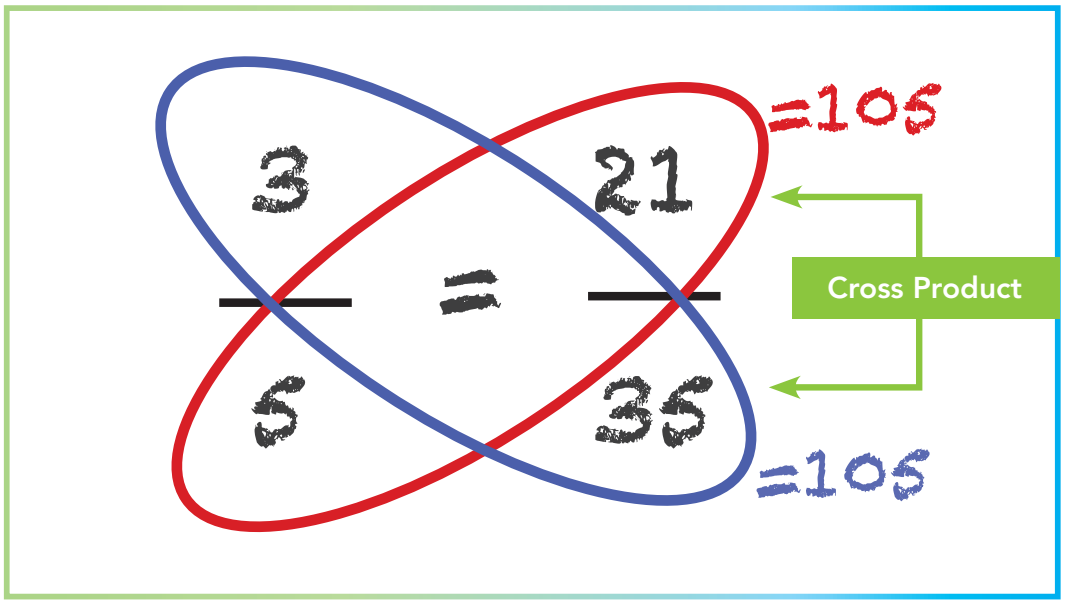
DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Multimedia	6.6d Examine the three distinct cultural regions of the Mediterranean world in terms of their location, the extent of each region at the height of its power, and the political, economic, and social interactions between these regions.	Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.	VI.C1	4a
		Uses both facts and opinions responsibly by identifying and verifying them.		
Narrative Organization		Interprets information and ideas by defining, classifying, and inferring.		
		Uses common organizational patterns to organize information in order to draw conclusions.	IV.A2	3d
		Forms opinions and judgments backed up by supporting evidence.		
Pacing		Publishes final product for a particular audience and purpose.		
		Interprets information and ideas by defining, classifying, and inferring.		
		Considers culturally divergent and opposing viewpoints on topics.	IV.A1	6d
Relationships		Uses common organizational patterns to organize information in order to draw conclusions.		
	Examine the conflict of the Crusades from three different perspectives: feudal Europe, Byzantine, and Islamic.	Cites all sources used according to local style formats.		
		Publishes final product for a particular audience and purpose.		
Sequence of Events		Uses interactive multimedia tools to exchange data collected and to learn curricular concepts by communicating with peers, experts and other audiences.	IV.B4	6b
		Determines what resources will most likely offer quality information		
Visual Information	6.7a Create maps that illustrate items exchanged and ideas spread along the Silk Roads, across the Indian Ocean, and on the Trans-Saharan trade routes.	Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.	VI.C1	3a

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Audience **Diverse Cultures** **Diverse Viewpoints** **Purpose**	Examine how the location of resources helped determine the location of trade routes and the economic impact of the exchange of resources. Study interregional travelers such as Marco Polo, Ibn Battuta, Mansa Musa, and Zheng He and examine why they traveled, the places visited, what was learned, and what was exchanged as a result of their travel. 6.7b Map the extent of the Mongol Empire at the height of its power. Examine the methods used by the Mongols to enable them to rule over a diverse population, noting how Mongol rule expanded trade. Examine the spread of the Black Death (Bubonic Plague) as a result of interregional exchange and its effects on various regions within Afro-Eurasia, using a variety of sources, such as maps, poetry, and other primary source documents.	Uses technology resources such as online encyclopedias, online databases, Web subject directories to locate information on assigned topics in the curriculum. Forms opinions and judgments backed up by supporting evidence. States and verifies what is known about the problem or question and makes connections to prior knowledge, Writes questions independently based on key ideas or areas of focus. Analyzes and evaluates what is known, observed, experienced to form tentative thesis or hypothesis. Uses organizational systems and electronic search strategies (key words, subject headings) to locate appropriate resources Uses table of contents, index, chapter and section headings, topic sentences and summary sentences to locate information and select main ideas. Uses the structure and navigation tools of a website to find the most relevant information. Uses both facts and opinions responsibly by identifying and verifying them. Takes notes by paraphrasing or using quotation marks when using someone else's words. Evaluates and paraphrases information that answers research questions. Cites all sources used according to local style formats.	IV.D1 II.D1 II.D2 VI.D1	6b 6a 7b 7c

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Argument	6.7c Examine how various technologies affected trade and exchanges. Some examples are types of ships, including junks and caravels; improvements to ships, such as sails and rudders; navigation tools, such as the compass and astrolabe; and gunpowder.	Uses both facts and opinions responsibly by identifying and verifying them.	V.A1	3d
Claims			IV.A1	5c
Comparing			IV.A1	1b
Contrasting		Analyzes and evaluates what is known, observed, experienced to form tentative thesis or hypothesis.	IV.A2	1d
Evaluating			I.D3	2b
Evidence			IV.D1	2c
Informational Texts			VI.C3	2a

VR Quest® STEAM Curriculum Guide
7th Grade Math

Proportional Relationships



Hamilton Buhl
Never-Ending Learning Innovation

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The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

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Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

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- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into proportional relationships with quantities. As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the proportional relationships you gain insight into multiplications, percentages and negative numbers. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure in proportional relationships or a learning walk showing casing all your content knowledge. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain a real life proportional relationship using two different quantities within a 35 minute time span
- Describe proportional quantities utilizing a graph in a 40 minute period
- Create a proportional relationship equation within a 40 minute period
- Compare and contrast two proportional relationships by testing equivalent ratios in a table over two class periods

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk. Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of proportional relationships in our lives:

Numbers or quantities are the two ways of relating quantities. In our everyday lives, proportional relationships are ever existent and play a large part of managing our money. People buy vehicles and consider the cost of maintaining it or how much gas it takes. There is a proportional relationship between the two quantities, which are the amount of gas and the amount of money. An SUV will cost more in gas to use than a Smart car, so the proportional relationship would be the amount of gas it takes and the money required to fill it up.

- Compare and contrast two different proportional relationships by utilizing the same theme by only changing one factor.
- Describe two scenarios with varying quantities for each. (Hint: not every car holds the same amount of gallons.)

Know the significance of art, science and technology throughout the mathematical history:

In art, proportional relationships are especially relevant when mixing colors, textures and in determining designs. To be asethically pleasing to the beholder, an artist needs to identify the quantities used in order to create a sense of balance that will be appreciated. Physics, specifically, relies on proportionality of quantities whether it is a direct or inverse relationship. For example, the force equation where force = mass * acceleration is affected by change in one quantity as it will affect change in the other quantities as well. Additionally, technology involves physics with the baby microchips in computers and utilizes proportional relationships in terms of output through the functioning of accessibility, as well as the satellites.

Explain how today's practices will be applied to the future:

Considering what we know about proportional relationships and quantities, describe its relevance to the future. Researching the past, studying our current times and history and looking towards the future, assess where we can expect to be with immigration, prison reform or SAT scores. Generate a list of factors that can change quantitive input and the end results will alter.

Taking it to the next level with critical thinking:

Proportional relationships are ever present in real life examples consistently throughout our day. Walking around a track 2 laps in 10 minutes illustrates the unit rate is 2/10 = 1/5 laps per minute. Understanding the premise of proportional relationships foster problem solving and a stronger sense of how many things work in life. Some real life problems can be seen in scaling a diagram (drafting and architecture), adjusting a recipe, gambling or quantifying chance (odds & probability) or determining percent increase or decrease pertaining to discounts and price markup.

- Determine the proportional relationship of a sale item in the store.
- Identify two proportional relationships within your weekly routines.
- Assess altering data with respect to quantities and generate rules.
- Explain how quantify proportional relationships of energy expended in the different core subject areas.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of proportional relationships with respect to social justice across our nation provides a wealth of opportunities and challenges to design a quest where players not only better understand how math works, but also internalize the importance of being a good citizen and developing student agency.

Many students have not realized the power of their voices and are unaware of their own ability to effect change. While proportional relationships are often seen in terms of money, obtaining better value or buys, a truly authentic learning opportunity can be seen in incarceration or crime rates. People of color are disproportionately imprisoned in relation to the seriousness of the crimes committed. Textbook math can easily be applied into authentic real-world problems that highlight social justice issues of fairness, equity, crime rates, population growth and cities deemed to be dangerous.

- Tell players to create a timeline of noteworthy African American inventors/innovators. What affect did their innovations have immediately and in the future? What changed that fostered a positive perception or acceptance?

- Political climate and conditions influence our society. Illustrate the specific turning points in recent news with respect to social justice change. Discuss the proportional relationship of why the long overdue tide has changed. What quantities changed within the equation?

- Create a museum gallery walk of contributions of important social activists from the past to the present. Investigate how and what in the proportional relationships changed as they gained momentum. (Hint: looks at elections and historical events.)

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.khanacademy.org/math/cc-seventh-grade-math

https://www.youtube.com/watch?v=xp3mhUo71HE

https://www.youtube.com/watch?v=-U5N5Y5pWc8

https://www.youtube.com/watch?v=Zm0KaIw-35k

https://www.youtube.com/watch?v=Z_f2XEr-ppo

https://www.youtube.com/watch?v=6ItURzd64WE

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2

1.

2.

Body Panels 3-10

3.

4. P

5.

6.

7.

8.

9.

10.

Climax

11.

Summary

12.

Math Vocabulary Word Wall

2D	3D	Absolute	Coordinate Value
Interest	Ordered	Origin Pair	Percent
Percent error	Percent Increase	Prediction	Plane
Probability	Proportion	Proportional Relationship	
Principal	Rate	Ratio	Rational Coefficient
Scale	Scale Drawing		

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Explain	Explore	Express	Fluent	Generate
Identity	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method /Representation					

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

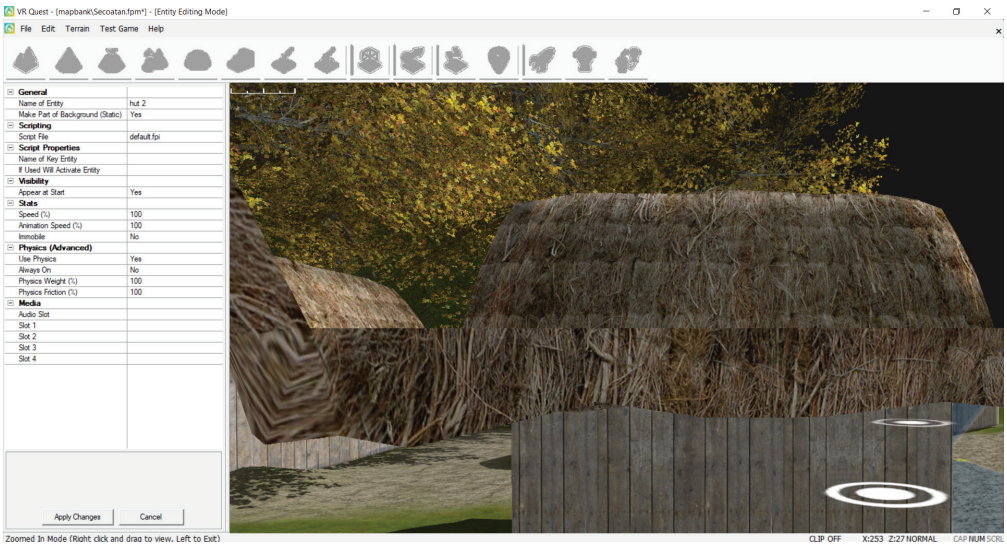
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

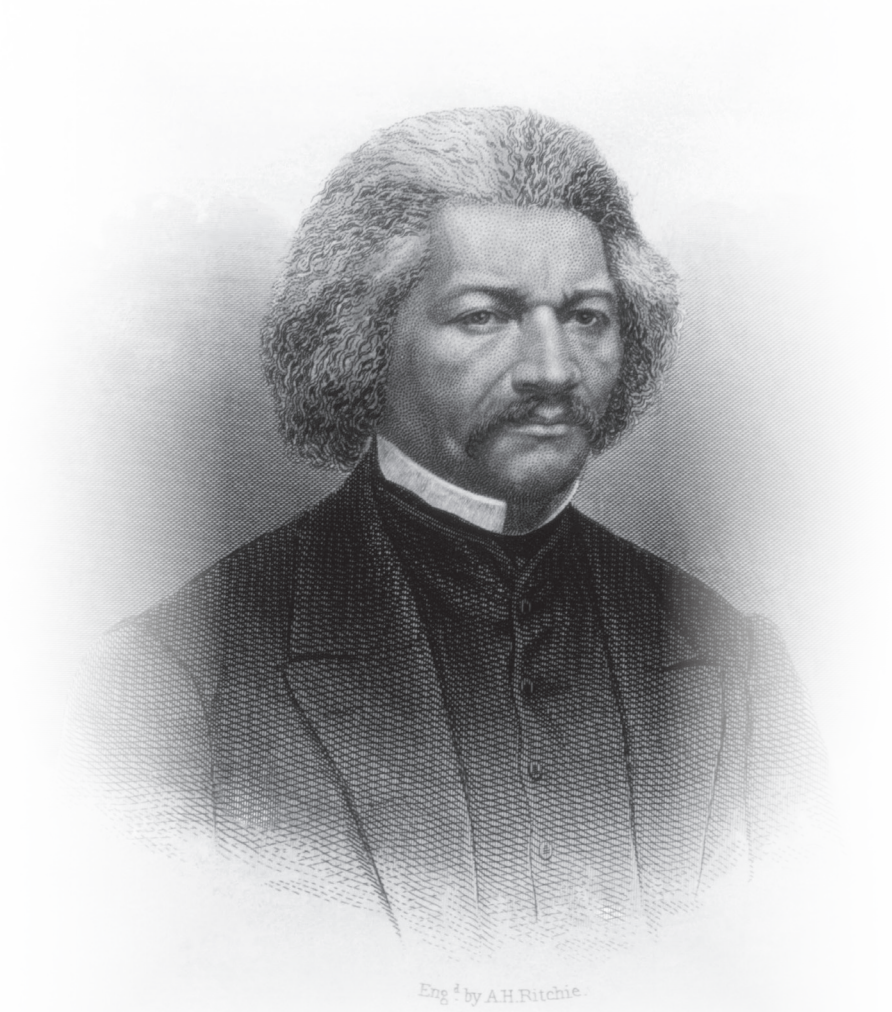
Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	7.RP.1 Compute unit rates associated with ratios of fractions.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	7.RP.2 Recognize and represent proportional relationships between quantities.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	7.RP.2a Decide whether two quantities are in a proportional relationship.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1 I.B1	3d
Facts	7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	5c
Illustrations		Uses pre-selected Web resources to locate information.	V.A1	3c
Informational Texts	7.RP.2c Represent a proportional relationship using an equation.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	2b
Key Details	7.RP.2d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	Uses various note-taking strategies.	IV.D1	3d
Narrative		Uses common organizational patterns to organize information.		6a
Opinion	7.RP.3 Use proportional relationships to solve multistep ratio and percent problems.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	II.D2	
Organization		Identifies and evaluates the important features for a good product.	I.B2	1b
Point of View	7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers. Represent addition and subtraction on a horizontal or vertical number line.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.A2	1b
Quotations		Restates ideas of others accurately and adds own perspective.	VI.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events**	7.NS.1a Describe situations in which opposite quantities combine to make 0. 7.NS.1b Understand addition of rational numbers; p + q is the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. 7.NS.1c Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation/ product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	III.C2 III.B2 VI.C2	6d 6a 7b
Audience **Organization** **Purpose**				

VR Quest® STEAM Curriculum Guide
7th Grade English

Frederick Douglass



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- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with the informational text on Frederick Douglass, a remarkable man, role model and leader well before his time. As Frederick Douglass so eloquently states: "Once you learn to read, you will be forever free." You will see firsthand the positive outlook with which Frederick Douglass approached life experiences and opportunities.

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the past and read heart breaking stories as you gain insight into the mistakes America made and a better understanding of what occurred during enslavement. As you begin to read further, you will develop questions about history and come to admire the enduring legacy of African American leaders who fought for freedom, equality, the right to read and shape the world we live in today.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of literacy during the period of African American enslavement within a ten minute time period
- Determine the importance of developing a network of like minded individuals and/or supporters over a 30 minute period
- Explain how Frederick Douglass rose above his circumstances within a 15 minute time limit
- Compare and contrast the writings of Frederick Douglasss and Harriet Beeecher Stowe, a white woman, and also Abraham Lincoln in their philosophies and ideologues within 45 minutes

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the legacy of Frederick Douglass in American culture:
Frederick Douglass was a man well ahead of his time. His brilliance, ovations and writings indicate he spent serious and considerable time reflecting on his present day life and the best method to eliminate slavery and improve the conditions of other enslaved folk. Though he lived over 100 years ago, his philisophies are still very relevant and important in American culture. Frederick Douglass' advocacy for literacy and education are still the cornerstones of exiting a life of poverty, struggle and hardship. His courage, wisdom and dedication are indicative of the excellence he strove for on a daily basis.

- How did Frederick Douglass's literacy, education and strong articulation affect learning outcomes for the greater good and mankind? How did his experiences and his personal beliefs play into his growth and development?
- Compare and contrast Frederick Douglass to Colin Kapernick. How are they similar and how are they different? They both fought for important causes and risked all they had.
- Define the multiple pathways in which one could become a social activist or fight for social justice utilizing the principles Frederick Douglass so staunchly believed in.

Know the significance of art, science and technology throughout the mathematical history:
Though initially Frederick Douglass might seem hard to relate to the arts or a STEM approach, transdisciplinary teaching is all about thinking outside of the box. Frederick Douglass's journey to freedom can be mathematically calculated in hours, days, months, years, steps, number of states and countries crossed.

Using Frederick Douglass's main principle and belief that education is emancipation helps us rise and best assist in inspiring new projects. Prominent people that supported his speeches and writing can be used with a thinking map to highlight their connections and ways they were enabled to help the cause of abolition. Drama, theater and acting can be incorporated in recreations and reenactments of Frederick Douglass's speeches and travels.

Lastly, artists of that time period will be studied and some will be replicated as a way of determining how artists expressed the times and difficulty they were facing.

Explain how past practices are current and still used today:
Knowing our pasts helps us to better understand the future. The mistakes our country made have been continual perpetuated because of failure to acknowledge, teach and break the cycles of discrimination, privilege and entitlements and accept that diversity is beauty, growth and the pathway to become a world class nation. As you reflect on agents of change

that have worked tirelessly to propel America towards social justice, create a story, poem, dialogue, art piece or digital timeline or infographic on the past to the present with the various events and that different people that have contributed.

Taking it to the next level with critical thinking:
Fredrick Douglass greatly contributed to both the past and the present modern day with his speeches, books and critical thinking. Understanding his experiences and dispositions (mindset, soul set, heart set and health set) provide a framework of understanding for deeper meanings in life. Reflect on the importance of being knowledgeable of great past leaders that might not typically make it into history books. Consider why Frederick Douglass may not have received more recognition for his achievements.

- Identify and describe two different heroes like Frederick Douglass and Harriet Tubman. What did they do in times of difficulty? What character traits did they exhibit? Provide examples. What was their relationship with their environment and others? In what manner did they conduct themselves?
- Assess how Frederick Douglass inspired the immediate crowds and the future.
- Who came after him and what ground work did he lay for them?
- Explain how Frederick Douglass challenged the status quo. Some have compared him to Obama. Compare and contrast the two figures.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of the Frederick Douglass with respect to abolition, suffrage and human rights provides a wealth of opportunities and challenges to design a quest where players discover better practices for using their voice and becoming strong and articulate activists for social justice causes. Frederick Douglass had strong beliefs and exposed false Christians who used Christianity as a weapon to appear concerned and compassionate, when in reality they were pious, brutal and contradicting towards their slaves. As such, he raised questions in his speeches of how slave owners could claim to be religious when it was immoral, cruel and ungodly to rape, beat and maim other human lives. He argued to be Christian is to live kindly and compassionately so that all others are always treated with humility and respect. With the introduction of slavery and human ownership, Frederick Douglass noted that torture, cruelty, pain and suffering were introduced, but ignored.

- Tell players to utilize various globes, maps and documents to show the location of different prominent African American leaders during all different time periods. Create a digital timeline of them and align historical events in history to their tenure. What affect did these leadershave immediately and in the future?
- Geographic locations / places and political / religious conditions influence everyday people. Create an infographic with attached MP3 files through audacity indicating how different regions in the world might view and apply the concepts of oppression and/or slavery.
- Create a museum gallery walk of the different relevant African American leaders. Selecting two to compare and contrast, ighlight three character traits and support the traits with examples. Be prepared to discuss connections you make to them as good readers and writers make connections. The three types of connections you can make are text to text, text to world or text to self.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.goodreads.com/author/quotes/18943.Frederick_Douglass

https://www.britannica.com/biography/Frederick-Douglass

https://www.biography.com/activist/frederick-Douglass

https://www.nps.gov/frdo/learn/historyculture/frederickDouglass.htm

https://time.com/5614930/frederick-Douglass-fourth-of-july/

https://www.battlefields.org/learn/biographies/frederick-Douglass

https://www.history.com/news/frederick-Douglass-escapes-slavery

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitve Accountable Talk Extension Stems

Based on the evidence . . .

The key information indicates / identifies / explains . . .

This reminds me of . . .

This is relevant because . . .

In summary, this means . . .

To expand / piggyback off of what _____ said . . .

I infer this represents . . .

I used to think _____, but now _____

What's important here is . . .

It's interesting that . . .

One thing we should notice is . . .

One thing we haven't considered is . . .

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	7R1: Cite textual evidence to support an analysis of what the text says explicitly/ implicitly and make logical inferences.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	7R2: Determine a theme or central idea of a text and analyze its development over the course of the text; summarize a text.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1 I.B1	3d 5c
Facts	7R3: In literary texts, analyze how elements of plot are related, affect one another, and contribute to meaning. In informational texts, analyze how individuals, events, and ideas are introduced, relate to each other, and are developed.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	3c
Illustrations		Uses pre-selected Web resources to locate information.	V.A1	2b
Informational Texts	7R4: Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings. Analyze the impact of specific word choices on meaning, tone, and mood, including words with multiple meanings.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Key Details		Uses various note-taking strategies.	IV.D1	6a
Narrative		Uses common organizational patterns to organize information.	II.D2	1b
Opinion	7R5: In literary texts, analyze how structure, including genre-specific features, contributes to the development of themes or central ideas. In informational texts, analyze the structure an author uses to organize a text, including how the sections contribute to the whole and to the development of themes or central ideas.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	I.B2	1b
Organization		Identifies and evaluates the important features for a good product.	I.A2	1b
Point of View		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	VI.A2	3c
Quotations		Restates ideas of others accurately and adds own perspective.		

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events** **Audience** **Organization** **Purpose**	7R6: In literary texts, analyze how an author develops and contrasts the point of view and the perspectives of different characters or narrators. In informational texts, analyze how the author distinguishes his or her position from that of others. 7R7: Compare and contrast a written text with audio, filmed, staged, or digital versions in order to analyze the effects of techniques unique to each media and each format's portrayal of a subject. 7R8: Trace and evaluate the development of an argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient and recognizing when irrelevant evidence is introduced. 7R9: Use established criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences. 7W6: Conduct research to answer questions, including self-generated questions, drawing on multiple sources and refocusing the inquiry when appropriate. Generate additional related questions for further research and investigation. 7W7: Gather relevant information from multiple sources; assess the credibility and accuracy of each source; quote or paraphrase the data and conclusions of others; avoid plagiarism and follow a standard format for citation.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	III.C2 III.B2 VI.C2	6d 6a 7b

VR Quest® STEAM Curriculum Guide
7th Grade Social Studies

Native Americans

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars are guided to consider all perspectives. How did all parties feel? Were some more privileged and have an advantage over others? How do issues of power, wealth and morality influence exploration and colonization? Could the United States have shown more empathy or compassion in dealing with other countries or groups of people? If you were given a chance to lead, what would you do differently? Why is it important to always consider the human side of the equation? How can we right the wrongs of the past?

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into history. As the adage so eloquently states: "in order to guide your future you must understand your past."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through Native American landscapes and gain insight into the responsibilities people have during periods of growth and globalization.

Many have been fascinated by Native Americans for centuries. As you recreate an authentic village and community, think about ways to insert your thoughts, opinions and ideas on how many situations were handled. How could interactions had been more fair or compassionate?

In this quest, you create an edventure in the unique environment of New York Native Americans.

The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

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01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Investigate how European explorations of the New World resulted in various interactions with Native Americans within a five-year period.
- Compare and contrast how issues of power, wealth and morality influenced exploration and colonization in the 1600s.
- Explain the similarities and differences between a New York Native American tribe and one from the south.

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

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Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the influence Native Americans had on western culture:
Native Americans were a very diverse and culturally rich people. They had many different tribes throughout the US and New York State. In daily life they constantly drew upon art, music and dance as well as a strong sense of oral history or storytelling to pass down their ancestors' lives and accomplishments.

The houses and communal dwellings illustrate an astounding level of engineering. Wood saplings were harvested while green and bent into the desired shape woven between vertical staves of wood. These were left to dry out and would maintain their shape creating a sturdy wall structure. Oak trees would be cut down in late summer and left over till spring when the bark would be separated from the pulpwood in long sheets. These sheets would then cover the dwelling in layers creating a waterproof barrier from the elements. A cooking and heating fire would normally be in the center of the building keeping everything warm in the winter months.

- What different indigenous cultures were there?
- Critique the affect Native American housing has on modern housing today.
- Describe the geography.
- Explain their religion/spirituality.
- Compare and contrast their governments and economics (food, housing and trade).
- Investigate Native American traditions, oral history and culture.

Know the significance of math throughout everyday life:
Mathematics was part of everyday life for most Native Americans - the village was encircled by a precisely made palisade of vertical poles set in a caracol or spiral form which kept the main part of the village hidden yet one entrance to defend in case of attack. The crops were also laid out in rows with a calculation to provide sufficient food for the village for the coming year.

Explain how past practices are current and still used today:
Native Americans were very advanced in science and technology with agriculture and cultivation a central aspect of daily life. Corn was planted with dead fish and beans. The dead fish supplied the nutrients for the plants while the beans grew close to the ground and kept much-needed moisture in the soil. The beans also acted as a natural deterrent to maize pests. These individual plantings were built on little mounds with indentions on top to collect rainwater.

Taking it to the next level with critical thinking:
European explorations of the New World resulted in numerous interactions with Native Americans and in colonization. American colonies were established for a variety of reasons and developed differently based on economic, social and geographic factors. Colonial American had a variety of social structures under which not all people were treated equally.

Social emotional learning:
How do issues of power, wealth and morality influence exploration and colonization? How did it affect all those involved as well as subsequent generations? To what degree did the Western Hemisphere hinder equality and Civil Rights? Please make sure to support any opinions you form with text evidence so the person who plays your game understands how you came to the conclusions you did.

- European encounters w/Native Americans
- Doctrine of Discovery
- Reasons for Native American population decline and loss of land
- British interactions with Wampanoag
- Dutch interactions with Mohawk, Mohican and Munsee
- French interactions with Algonquin
- Spanish interactions with Muscogee
- Interactions between Native Americans, Africans and Europeans
- Native American influence on western culture
- Role of Native Americans
- Conflicts between indigenous peoples and European settlers

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Native Americans in New York give you a wealth of opportunities and challenges to design a quest where players discover more about this amazing state as they face and overcome obstacles and problem solve. Here are a few ideas:

- Tell players that America has been discovered and they need to know different geography terrains and location to avoid encounters with unknown entities.
- Challenge players to create a detailed longhouse or setting by changing aspects of the physical environment.
- Explore the exterior of village to find actual evidence that there may be life apart from the village and the immediate vicinity.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

http://www.native-languages.org/york.htm

http://algonquinculture.org/

https://paththroughhistory.iloveny.com/themes/native-americans/#.WqU4Z62ZP3A

https://www.nytimes.com/topic/subject/native-americans

https://steinhardt.nyu.edu/scmsAdmin/media/users/xr1/Language_n_Cultural_Awareness/NativeAmericanCultureLanguageNY2-27-13.pdf

https://www.accessgenealogy.com/native/new-york-indian-tribes.htm

http://www.nysm.nysed.gov/exhibitions/ongoing/native-peoples-new-york

http://www.nysl.nysed.gov/scandocs/nativeamerican.htm

http://www.indians.org/articles/corn.html

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a New York State Native American VR Quest®.

Map of Native American Tribes of New York State

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2

1. Young brave guides the player through a wooded trail that widens with manicured walkways and fences leading into a small village of willow and branch buildings.

2. Player comes to longhouses and mat covered huts. Many of these were two-story structures where the family could sleep on the loft in the evening and have more floor space available for activity during the day.

Body Panels 3-10

3. Player must find cultural artifacts within Native American community to create a journal documenting his/her journey.

4. Player recognizes how advanced in science and tech Native Americans were with agriculture and cultivation a central aspect of daily life. Corn was planted with dead fish and beans.

5. Voice: *"The dead fish supplied the nutrients for the plants while the beans grew close to the ground and kept much-needed moisture in the soil".*

6. Player moves through the beans which also acted as a natural deterrent to maize pests. These individual plantings were built on little mounds with indentions on top to collect rainwater.

7. Young brave states, *"Maize is an amazing product of Indian ingenuity and genetic manipulation. The original maize plant started out looking like a stalk of wheat and through millennia of selective cultivation, emerged as the corn you know today. Even modern science hasn't been able to reproduce this feat. We also invented popcorn".*

8. Voice: *"Mathematics was part of everyday life for us – money was not used. While they didn't use physical money, they would trade with wampum, a purple shell cut into beads."*

9. Player walks around the perimeter of the tribes' grounds taking note of all daily activities and nodding in appreciation.

10. Player returns to the center of the village and greets elders.

Climax

11. Player needs the most important artifacts to present to the elders. *"Oh no! I don't have the most important artifact from my journey. What will I do?"*

Summary

12. Teamwork *"Congratulations, my friend. You found it. Great job!!"*

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

For example, this Native American seed pot was used by tribes to hold seeds needed for planting. Different artifacts can illustrate what daily life was like or even what objects held cultural or spiritual importance in the Native American belief system.

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Analyze Argument Cause/ Effect Claims Classification Comparing Contrasting Counterclaims Dialogue Domain Specific Vocabulary Evidence Explanatory Text Facts Graphics Informational Text Key Details Main Topic	7.1a Examine theories of human settlement of the Americas. Compare and contrast different Native American culture groups of North America, with a focus on the influence geographic factors had on their development. Examine various groups of Native Americans located within what became New York State and the influence geographic factors had on their development. 7.2a Explain the significance of the technological developments and scientific understandings that improved European exploration such as the caravel, magnetic compass, astrolabe, and Mercator projection. Examine the voyage of Columbus, leading to the Columbian Exchange and the voyages of other explorers such as Champlain, Hudson, and Verrazano.	States and verifies what is known about the problem or question and makes connections to prior knowledge. Writes questions independently based on key ideas or areas of focus. Analyzes and evaluates what is known, observed or experienced to form tentative thesis or hypothesis. Determines what resources will most likely offer quality information. Considers culturally divergent and opposing viewpoints on topics. Uses the categorization of materials within Dewey areas to locate resources and browse for additional materials. Uses technology resources such as online encyclopedias, online databases, and Web subject directories to locate information on assigned curriculum topics. Uses organizational systems and electronic search strategies - keywords, subject headings) to locate appropriate resources. Uses multiple sources to acquire background information and brainstorms ideas for further inquiry.	1.A1 1.A2 IV.A1 II.A2 IV.A1 IV.A2 IV.A1 II.A2 V.A1 I.D1 III.B1 IV.B1 IV.B4 III.B2 II.B3	6c 4c 6a 3a 3b 5c 5c 1a 1b 3c 6d 3a 4b 5b 1b

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Multimedia	7.2b Compare and contrast British interactions with southern New England Algonquians, Dutch and French interactions with the Algonquians and Iroquoians, and Spanish interactions with Muscogee. Investigate other Native American societies found in their locality and their interactions with European groups.	Questions the differences between sources and seeks additional sources to resolve.		
		Evaluates and paraphrases information that answers research questions.	IV.C1	4c
Narrative		Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.		
		Uses both facts and opinions responsibly by identifying and verifying them.	I.C1	3d
Organization		Takes notes by paraphrasing or using quotation marks when using someone else's words.	VI.B2	4a
		Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.		
Pacing		Uses both facts and opinions responsibly by identifying and verifying them.	VI.B3	4d
Point of View		Interprets information and ideas by defining, classifying, and inferring.	II.B2	6d
		Uses common organizational patterns to organize information in order to draw conclusions.		
Relationships		Forms opinions and judgments backed up by supporting evidence.	III.B2	3b
		Publishes final product for a particular audience and purpose.		
Sequencing		Interprets information and ideas by defining, classifying, and inferring.	I.B3	3a
		Considers culturally divergent and opposing viewpoints on topics.		
Visual Information		Uses common organizational patterns to organize information in order to draw conclusions.	VI.C1	4a
		Cites all sources used according to local style formats.		

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Audience	Examine the major reasons why Native American societies declined in population and lost land to the Europeans. Investigate the reasons for colonization and the role of geography in the development of each colonial region. Examine the economic, social, and political characteristics of each colonial region.	Publishes final product for a particular audience and purpose.		
		Uses interactive multimedia tools to exchange data collected and to learn curricular concepts by communicating with peers, experts & other audiences.	VI.C2	6d
Organization		Determines what resources will most likely offer quality information	III.B1	6b
		Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.	II.B3	6a
Purpose		Uses technology resources such as online encyclopedias, online databases, Web subject directories to locate information on assigned topics in the curriculum.		
		Forms opinions and judgments backed up by supporting evidence.		

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Analyzing	7.2d Compare and contrast the early Dutch settlements with French settlements and with those in the subsequent British colony of New York in terms of political, economic, and social characteristics, including an examination of the patroon system.	States and verifies what is known about the problem or question and makes connections to prior knowledge,	I.C3	2c
Claims		Writes questions independently based on key ideas or areas of focus.	I.D1	3b
Comparing		Analyzes and evaluates what is known, observed, experienced to form tentative thesis or hypothesis.	IV.D1	3b
Contrasting		Uses organizational systems and electronic search strategies	II.D1	3b
Evaluating		(key words, subject headings) to locate appropriate resources	IV.D1	3d
Evidence		Uses table of contents, index, chapter and section headings, topic sentences and summary sentences to locate information and select main ideas.	I.D1	5c
Informational Texts	Examine the changing status and role of African Americans under the Dutch and English colonial systems.	Uses the structure and navigation tools of a Website to find the most relevant information.	I.D4	1b
Questioning		Uses both facts and opinions responsibly by identifying and verifying them.	VI.D1	1d
Reasoning	Examine Dutch contributions to American society, including acceptance of a diverse population, a degree of religious toleration and right to petition. Examine Dutch relations with Native Americans.	Takes notes by paraphrasing or using quotation marks when using someone else's words.	V.B1	2b
Quotation		Evaluates and paraphrases information that answers research questions.	III.A1	2c
Audience		Cites all sources used according to local style formats.	V.D3	7
Purpose			IV.D2	6d

VR Quest® STEAM Curriculum Guide
8th Grade English

Inside Out and Back Again

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** ccurriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated and placement, colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Through the use of visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM ccurriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest has the ability to showcase different cultures and heritages as valued assets to learning and offer an opportunity for the learning community to expand its understandings of global awareness international mindedness

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun filled ride. You are the creator of this journey into literacy and historical fiction with this novel that focuses on the themes of family, struggle, cultural differences and warfare. As Albert Einstein so eloquently states: "Rejoice with your family in the beautiful land of life." You will see firsthand the strong ties and the commitment to loved ones are what life is truly is about.

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through another country, another land, another culture and let the words magically touch your heart and transport you to a different time and place.. As you begin to read further, you will develop questions about history and come to admire the enduring legacy of African American leaders who fought for freedom, equality, the right to read and shape the world we live in today.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of prejudice, discrimination and bullying in the novel and it's correlation to the hate crimes committed in America from 2016-2020 within a 45 minute period
- Determine the importance of routines and structure in immigrants adapting socially, culturally, linguistically and economically over a three 45 minute class periods
- Explain within a 20 minute time frame how the quote "families are made in the heart" is demonstrated by the main characters
- Compare and contrast the family customs and values from the novel with the average American's family and customs from 2000-2020

Your objectives will vary depending on the type of VR Quest® you design. Your quest may have an objective that requires player participants to acquire artifacts. Or, your quest could have an objective that is based on an educational gallery walk. Regardless of which one you select, an objective is necessary to guide the game designing process, just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the necessity of adaptation and assimilation for immigrants:
Ha was a child struggling to understand a new culture and American customs. Realizing that she and her family are starting at the lowest rung of the social ladder, she considers methods, situations and circumstances that will enable them to adapt and thrive in their new home. While maintaining her identity, rituals and routines from her country, Vietnam, she learns to incorporate new cultural nuances from American life in order to adjust and find some sort of balance. Ha's steadfastness, reflection and ability to stay tuned into her environment help her to stay focused, happy and true to herself. The book is most poignant when Ha comes to the realization that racism exists in everyday American life even among children.

- How did Ha's experiences and cultural lens prevent her from seeing racism initially? Does having the background knowledge of American segregation and history prepare a person for the bullying and intimidation Ha went experienced? why or why not?
- Compare and contrast the theme of warfare in her homeland, Vietnam, as well as in her daily life in American schools and society. Which seems more determential and why?
- Define how Ha's cultural lens accounts for her ignorance in identifying and understanding racism and hate.

Know the significance of art, science and technology throughout the mathematical history:
STEAM is present throughout the novel, Inside Out & Back Again, as demonstrated with Ha learning embroidery and fractions as she prepares to celebrate the lunar new year. In Asian countries, embroidery is consider a treasured skill and art form. Learning it not only helps to found and maintain a connection to Vietnamese culture, but helps to instill patience, persistence and an attention to detail.

This novel is rich in teaching opportunities and making connections. A practical application of math and science are intertwined as illustrated with the economics of high prices in relationship to the food scarcity. An everyday implication can be expanded upon when the caption of the refugee ship implements food and water rations. As it takes more than three weeks before an American navy vessel brings supplies, one must know not only how long the supplies will last, but also how many people can continue to be fed in that time period.

This helps the reader to see how math is relevant and present in everyday life, especially where struggle is concerned.

Explain how past practices are current and still used today:
Understanding the past always helps build upon the present and helps in making adjustments for change in the future. As Ha comes to learn about American history, racial segregation and crimes of its ancestors, she gains insight into hate and discrimination. Building increasing acceptance both at home and at school, Ha reflects on the last year and her new life when the new year comes to pass.

Though Ha's lifestyle in America is very different from her life in Vietnam, she recognizes when she should compromise, takes risks and when she should accept help from others. In growing and learning, not only is her family's future stronger, more secure and stable, but Ha learns to appreciate her new life and accept others. Considering the troubled history of Native Americans and African Americans, what suggestions for America do you have to reach a balance and peaceful existence like Ha did?

Taking it to the next level with critical thinking:
Family is a strong and powerful theme throughout the book. Nine years earlier, Ha's dad went missing on a navy mission. Together with her mother, Ha regularly prays for his return. His absence brings the family closer especially in times of trouble and struggle. One of Ha's older brothers is away at school, but they still have a solid bond. Though there is a distance, they know they can rely on each other and turn to talk out their problems. In essence, family is everything and the one constant, the one stable and the source of peace and happiness.

- Identify and describe the significance of food scarcity, food for birthday & holiday celebrations and the two papayas.
- Assess the importance of making choices. Ha's brother changed his mind and ultimately made the choice to leave. The family made the choice to crowd on an over loaded vessel to sail to America knowing it could sink since so many bodies were on board. Ha's other brother made the choice to carry a chick in his palm. Two other refugees made the choice to commit suicide on the vessel since the presidential palace was overturned and South Vietnam no longer.
- Explain how Ha grew mentally, emotionally, spiritually and intuitively throughout the novel. Compare and contrast Ha to her brothers.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of the story and the main character, Ha, with respect to transitions and changes provides a wealth of opportunities and challenges to design a quest where players strengthen their voices particularly pertaining to immigration and bullying. How do you know when Ha changes and why? Consider the struggles and obstacles Ha encounters. Reflect on the relationships has Ha formed or developed. Consider how these help her through difficult situations and times. Determine the importance of each of these characters and cite text evidence to support these claims. Thinking about the symbolism of mother's purple amethyst ring, detail what is represented and the significance of it possibly being sold and then being lost.

- Tell players to utilize various globes, maps and documents to show the location of Ha's family start, journey and end destination. Create a digital timeline of them and align historical events in history to their tenure. Besides the political turmoil of Vietnam, consider that was happening in America at that time.
- Geographic locations / places and political / religious conditions influence everyday people. Create an infographic with attached MP3 files through audacity indicating how influx of immigration waves in the history of America.
- Create a museum gallery walk of immigrants that have contributed to American culture like Bob Marley, Albert Einstein, Irving Berlin, John Lennon, Carols Santana, Chinua Achebe, Audrey Hepburn, Celia Cruz, etc. The list is extensive. Good readers and writers make connections. The three types of connections you can make are text to text, text to world or text to self.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

Inside Out and Back Again Themes | GradeSaver

Theme of Inside Out and Back Again by Anne Li (prezi.com)

Vietnamese refugees - LAWS.com

A Personal History of Vietnam War Refugee Policies | History News Network

8 Facts About the Vietnam War and Vietnamese Refugees (borgenproject.org)

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitve Accountable Talk Extension Stems

Based on the evidence . . .

The key information indicates / identifies / explains . . .

This reminds me of . . .

This is relevant because . . .

In summary, this means . . .

To expand / piggyback off of what _____ said . . .

I infer this represents . . .

I used to think _____, but now _____

What's important here is . . .

It's interesting that . . .

One thing we should notice is . . .

One thing we haven't considered is . . .

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
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Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
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– Was the quest at an appropriate level of difficulty?
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In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

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When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

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Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	8R1: Cite textual evidence to strongly support an analysis of what the text says explicitly/implicitly and make logical inferences.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	8R2: Determine one or more themes or central ideas of a text and analyze their development over the course of the text; summarize a text.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1 I.B1	3d
Facts		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	5c
Illustrations	8R3: In literary texts, analyze how particular lines of dialogue or events propel the action, reveal aspects of a character, or provoke a decision. In informational texts, analyze how individuals, events, and ideas are introduced, relate to each other, and are developed.	Uses pre-selected Web resources to locate information.	V.A1	3c
Informational Texts		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	2b
Key Details	8R7: Evaluate the advantages and disadvantages of using different media—text, audio, video, stage, or digital—to present a particular subject or idea and analyze the extent to which a production remains faithful to or departs from the written text.	Uses various note-taking strategies.	IV.D1	3d
Narrative		Uses common organizational patterns to organize information.	II.D2	6a
Opinion		Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	I.B2	1b
Organization	8R8: Trace and evaluate an argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient and recognizing when irrelevant evidence is introduced.	Identifies and evaluates the important features for a good product.	I.A2	1b
Point of View		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	VI.A2	3c
Quotations		Restates ideas of others accurately and adds own perspective.		

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning		Paraphrases and summarizes information that answers research questions.		
Sequence of Events	8R9: Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences.	Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product.		
		Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance		
	8W6: Conduct research to answer questions, including self-generated questions, drawing on multiple sources, refocusing the inquiry when appropriate. Generate additional related questions that allow for multiple avenues of exploration.	Asks questions to clarify topics or details.		
		Understands the concept of "audience;" determines audience before creating product.		
	8W7: Gather relevant information from multiple sources; assess the credibility and accuracy of each source; quote or paraphrase the data and conclusions of others; avoid plagiarism and follow a standard format for citation.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.		
		Restates ideas of others accurately and adds own perspective.		
Audience	8SL5: Integrate digital media and/or visual displays in presentations to clarify information, strengthen claims and evidence, and add elements of interest to engage the audience.	Identifies and evaluates the important features for a good product.	III.C2	6d
Organization		Understands the basic concept of plagiarism as copying the work of others.	III.B2	6a
Purpose		Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
8th Grade Math

Rational and Irrational Numbers

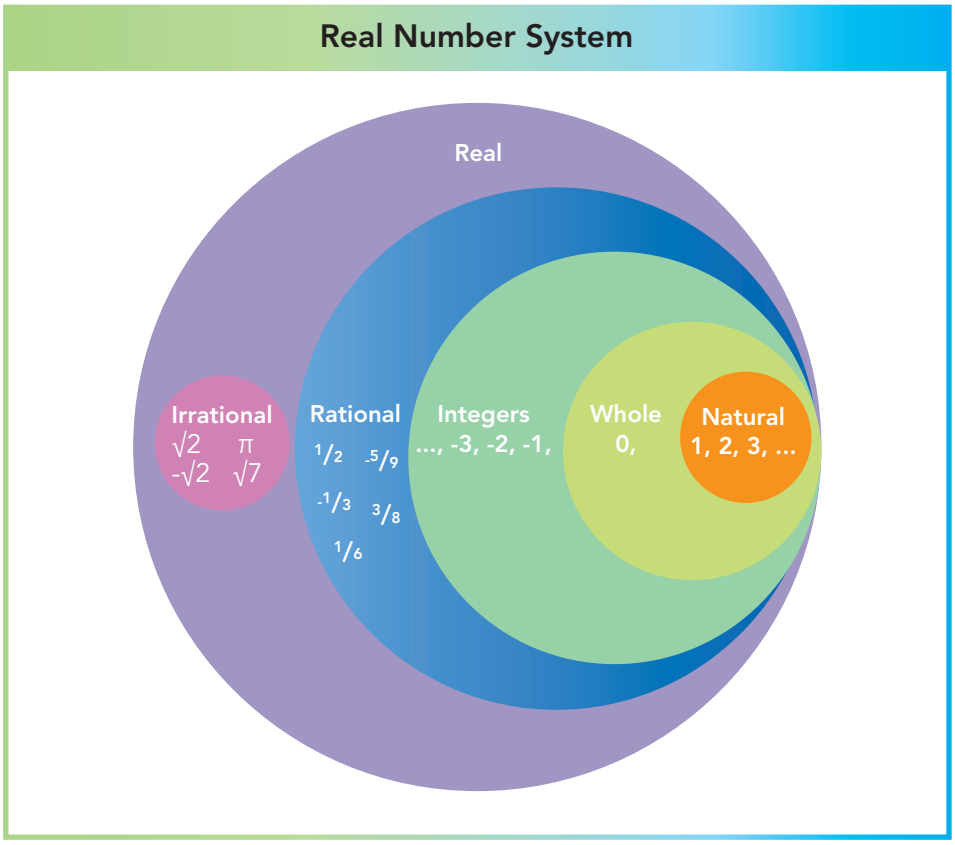

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Table of Contents

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VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into rational and irrational numbers. As the adage so interestingly states: "your trust in rationality makes you irrational." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of rational and irrational numbers as you gain insight into integers, exponents and scientific notation. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure within the real number system or a gallery walk. The graphic on the next page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain square roots of perfect squares up to 225 and cube roots of perfect cubes up to 125 in a 10 minute timeframe
- Define the square root of a non-perfect square is irrational with five minutes of articulation time
- Estimate the U. S. population as 3 × 108 and the world population of as 7 × 109 - then determine the world population as greater than 20 times larger than the US withing a three minutes
- Hypothesis algebraically systems as limited to at least one equation with at least one variable whose coefficient is 1 during a 30 minute time period.
- Compare and contrast a distance-time graph to a distance-time equation in order to determine which of the two moving objects has greater speed.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of rational and irrational numbers in our history:

Some might wonder where rational and irrational numbers fall with respect to history. Think about the how numbers affect and interact with us daily. Whether it be amount of screen time daily, time, schedules, appointments, money, investments, measuring area/ perimeters for renovations, etc., the simple facts are we are always using number in our lives. Since rational and irrational cover all the numbers there are essentially, consider how important numbers have been throughout history. Numbers pertain to dates, strategic defenses, square roots, etc. The background of and discovery of irrational numbers go back to Ancient Greece.Describe the location of the rainforest in relation to its four key layers (emergent, upper canopy, under-story, and forest floor).

- How did the coordinates or location of battles affect the war between France and Britain?
- Compare and contrast how irrational vs rational numbers foster the development of various math formulas and theories.
- Determine everyday implications for rational and irrational numbers).
- Define the significance of the Pythagoras theorem (Hint: architecture, carpenters, contractors).

Know the significance of art, science and technology throughout the mathematical history:

Rational and irrational number knowledge is essential in our STEAM dispositions. Art is often based in proportions, understanding ratios in paints and textures and finding balance. Incidentally, the Golden Ratio is an irrational number. Science is based on a concrete mathematical system as can be illustrated through DNA, genetic makeup, atoms with numbered and specific molecule makeup and the list goes on. Additionally, technology is also connected in a sense. Pi, the most famous irrational number, inspired the name of Raspberry Pi, a well regarded and innovative tech device for learning, connecting and fostering tech devices and STEM.

Explain how past practices are current and still used today:

The discovery of irrational numbers is seated in hot debate. Legend has it that Pythagorean philosopher, Hippasus of Metapontum first discovered irrational numbers. From irrational numbers, pi was born, as were many theorems like Pythagoras Theorem. What implications does an Ancient Greek Theorem have today? There are many like painting a wall, finding the right computer or TV, going on a road trip, selecting a suitcase. Utilizing numbers or determining fit with respect to space, requires using our foundation of numbers.

Taking it to the next level with critical thinking:

Pythagoras's theorem is applicable in real life situations. Build your better understanding of the irrational numbers with examples from the real-world. Since Pythagoras's theorem states the sum of the squares of two sides of a right triangle is equal to the square of the hypotenuse, one side of the right triangle is a, the other side b. Therefore, the hypotenuse is c.Pythagoras's theorem accordingly is : a2 + b2= c2. Now let's consider everyday examples.

- Determine the shortest amount traveled in a trip by applying Pythagoras's theorem.
- Identify cause and effect in lengthening or shortening a painting job by the length of a ladder.
- Assess what a suitcase can hold by taking its dimensions and defining which is suitable for a trip.
- Explain how measuring the diagonal length of a TV and utilizing Pythagoras's theorem will assist purchasing knowledge.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of rational and irrational numbers with respect to problem solving and troubleshooting provides a wealth of opportunities to design a quest where players insert history, reflect on practices from the past and present, as well as determine future implications for innovation and uses. As scholars discover better understand how all numbers play an important role in all facets of life, they can better experience that "ah ha" moment when learning is connected and most transparent. Take time and reflect on the avenues to foster transdisciplinary learning opportunities. Here are a few ideas:

- Tell players to utilize various coordinates (rational numbers), globes, maps and documents to show the location of battles aligned to social studies curriculum.
- Create a museum gallery walk of real life applications for pi with full narration.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:irrational-numbers/x2f8bb11595b61c86:irrational-numbers-intro/v/introduction-to-rational-and-irrational-numbers

https://www.mathsisfun.com/rational-numbers.html

https://www.mathsisfun.com/irrational-numbers.html

https://www.khanacademy.org/math/6th-grade-illustrative-math/unit-7-rational-numberstic/numbers/rational-and-irrational-numbers-with-examples.php

https://www.youtube.com/watch?v=hNk2xr4MUS8

https://www.youtube.com/watch?v=vbPUS-0Wbv4

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Math Vocabulary Word Wall

Apothem	Axis	Bivariate Data
Cluster	Coefficient	Congruent
Constant Rate of Change	Converse	Coordinate
Cube Root	Decimal	Dilation
Fraction	Frequency	Irrational Numbers
Linear Equation	Pythagorean Theorem	Quadratic Equations
Similarity Postulate	Square Root	Variables

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify
Compare	Compose	Convert	Decompose
Demostrate	Derive	Describe	Determine
Develop	Differentiate	Distinguish	Evaluate
Explain	Explore	Express	Fluent
Generate	Identify	Interpret	Justify
Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify
State	Understand	Use	Verify
Written Method	Representation		

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
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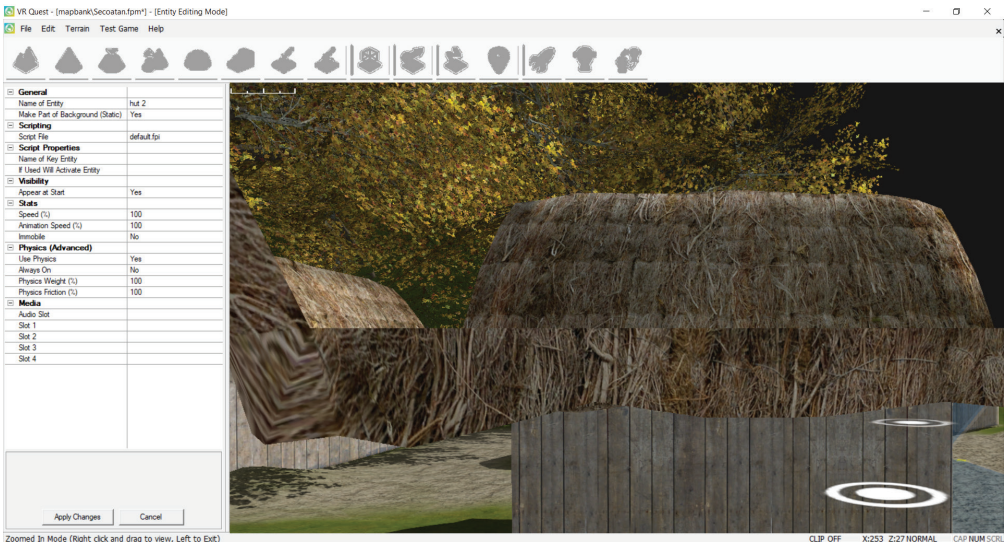

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Curricular Alignment

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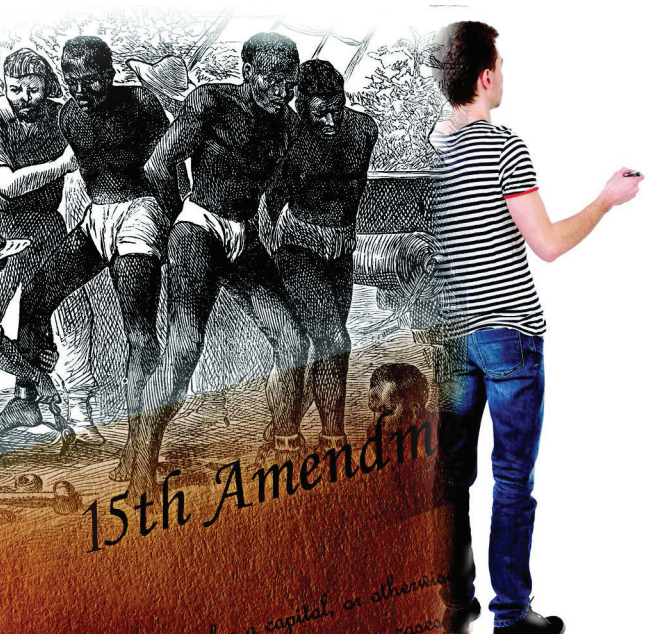
Author's Perspective	8.NS.1 Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion eventually repeats.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	Know that other numbers that are not rational are called irrational.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.	Uses pre-selected Web resources to locate information.	IV.C1	3c
Informational Texts		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	V.A1	2b
Key Details	8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number.	Uses various note-taking strategies.	III.B1	3d
Narrative		Uses common organizational patterns to organize information.	IV.D1	6a
Opinion	8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	II.D2	1b
Organization		Identifies and evaluates the important features for a good product.	I.B2	1b
Point of View	8.EE.4 Perform multiplication and division with numbers expressed in scientific notation, including problems where both standard decimal form and scientific notation are used.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.A2	3c
		Restates ideas of others accurately and adds own perspective.		

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
	Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.		VI.A2	
Quotations	8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.			3c
Reasoning			III.C2	
Sequence of Events	8.EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y=mx for a line through the origin and the equation y=mx+b for a line intercepting the vertical axis at b.		III.B2	6d
	8.EE.7 Solve linear equations in one variable.			6a
	8.EE.7a Recognize when linear equations in one variable have one solution, infinitely many solutions, or no solutions. Give examples and show which of these possibilities is the case by successively transforming the given equation into simpler forms.		VI.C2	

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Audience	8.EE.7b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.	Paraphrases and summarizes information that answers research questions.		
		Uses common organizational patterns to organize information.		
	8EE.8 Analyze and solve pairs of simultaneous linear equations.	Understands the concept of "audience;" determines audience before creating product.	III.C2	
Organization	8.EE.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	Understands the basic concept of plagiarism as copying the work of others.		
		Drafts the presentation /product. Assesses and revises own work with guidance.	III.B2	7b
		Asks questions to clarify topics or details.		
	8.EE.8b Solve systems of two linear equations in two variables with integer coefficients: graphically, numerically using a table, and algebraically.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	VI.C2	
Purpose	Solve simple cases by inspection.	Restates ideas of others accurately and adds own perspective.		
		Identifies and evaluates the important features for a good product.		
	8.EE.8c Solve real-world and mathematical problems involving systems of two linear equations in two variables with integer coefficients.	Identifies facts and details that support main ideas.		

VR Quest® STEAM Curriculum Guide
8th Grade Social Studies

Underground Railroad and Slavery



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VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve – all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars reflect on a nation's responsibilities to its citizens after a major conflict like the Civil War. Has the United States lived up to its potential and promise of history and status? What social and political responsibilities are associated with citizenship in democratic government?

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® has the ability to showcase different cultures and heritages as valued assets to learning and offer an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into history. As the adage so eloquently states: "in order to guide your future you must understand your past." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the United States and reflect on what a nation's responsibilities are to its citizens after a major conflict like a civil war. Many have been fascinated by the manner in which the United States has evolved. As you recreate an authentic geographic representation using a variety of maps, globes, aerial and satellite photographs and computer models, think about ways to insert your thoughts, opinions and ideas on how many situations were handled.

Industrialization and immigration contributed to the urbanization of America. There were important regional tensions following the Civil War that complicated efforts to redefine the status of African Americans and heal the nation. Compare and contrast the causes of the Civil War and the results. What role did the 13th, 14th and 15th Amendments play? How does a nation respond to economic, political and social challenges?

In this quest, you create an adventure in the unique environment during an enslavement period in the United States. The graphic on the next page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research.

While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Determine what new technology arose during the Progressive movement that contributed to urbanizing America.
- Investigate the expansion of slavery vs the abolition of slavery.
- Assess the election of Lincoln/secession.
- Compare and contrast urban and agricultural regions.
- Explain how problems resulting from the post-Civil War changes sparked the Progressive movement and increased call for reform.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02 Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the aftermath of the Civil War:
Following the Civil War, the United States was reconstructed and reshaped. Unifying the nation was difficult. There were many political factions. The country had to have an economic plan in place. At the same time, the United States sought to adapt to the changes through very specific amendments to the Constitution by not only abolishing slavery, but also including voting and citizenship rights. This reconstruction and time period was characterized by sharecropping, prison, labor, migration and African Americans in government. There were a variety of significant geographic features as people adapted or modified the physical environment as they migrated from the south to the north and as immigration occurred: the valleys, field and plantation as well as the mountains, the Atlantic Ocean, rivers and lakes, rural and urban areas.

- What were the effects of emancipation of the enslaved Africans?
- What were the causes and effects of The Civil War?
- Determine the relationship between Black Codes and the 13th, 14th and 15th Amendments.
- Describe the importance and impact of Freedman's Bureau.
- Compare and contrast Plessy v. Ferguson (1896) and the Jim Crow laws (1890s – 1920s).

Know the significance of math, science and technology:
Mathematics, science and were present in everyday life. Mathematical skills were employed to measure time by years, decades, centuries and millennia and to calculate time from fixed points of the calendar system, as well as interpret data presented in time lines. Technology assisted in shaping the Civil War.

The telegraph accelerated incoming news and the distribution of it as well. The North and the Midwest were joined by the railroads; thus improving the quality of life and communication.

For technological advances, new weapons like the repeating rifle and submarines were created. The United States' transportation infrastructure was in ruins and there was extensive damage due to the war.

Farms were in disrepair and were not highly mechanized. This gave way to a rebirth as properties and structures were rebuilt.

Math, science and technology advances can be seen in the new methods of production and distribution of farming, transportation developments and the establishment and growth of industrial corporations (railroad, steel) directly after the Civil War.

Explain how past and current race relations are today in the United States:
Explore and define different types of segregation. Identify the roles of individuals and key groups during this turbulent period (Booker T. Washington, George Washington Carver and the Tuskegee Model). Explore organized attacks on African Americans through such hate groups such as the KKK and the White League. Compare and contrast attacks from Colfax, LA, 1873; Coushatta, LA, 1874; New Orleans, LA, 1866; Hamburg, SC, 1876 and those that have occurred in present day United States. Determine ways that The Lost Cause influenced people's dispositions in the south.

Taking it to the next level with critical thinking:
Identify and explain different types of political systems and ideologies used at various times in United States history and explain the role of individuals and key groups in those social and political systems.

Investigate how events in United States history are chronologically related in time to one another and explain ways in which earlier events/ideas might influence subsequent events and ideas.

Determine patterns of continuity and change to larger historical processes and themes.

Identify situations in which social actions are necessary and determine an appropriate course of action in order to strive for extensions of human rights, freedom and social justice.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The Civil War and Post Civil War gives you a wealth of opportunities and challenges to design a quest where players discover more about this time period in United States history as they think critically and problem solve. Here are a few ideas:

- Tell players to reshape the United States after the Civil War by evaluating evidence about events from diverse sources including but not limited to written documents, artifacts, photographs, works of art, oral traditions, charts and graphs, as well as other primary and secondary sources.
- Challenge players to create a detailed museum walk of the cultural, artistic, science and technology artifacts that is narrated by prominent historical figures of that era.
- Explore the migration from the south to the north. Recreate and describe the relationship between geography, history and economics as a context for events and movement in the United States.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.factretriever.com/civil-war-facts

https://www.ducksters.com/history/civil_war/reconstruction.php

https://www.britannica.com/event/Jim-Crow-law

https://www.history.com/topics/black-history/black-codes

https://civilwarhome.com/poemssongs.html

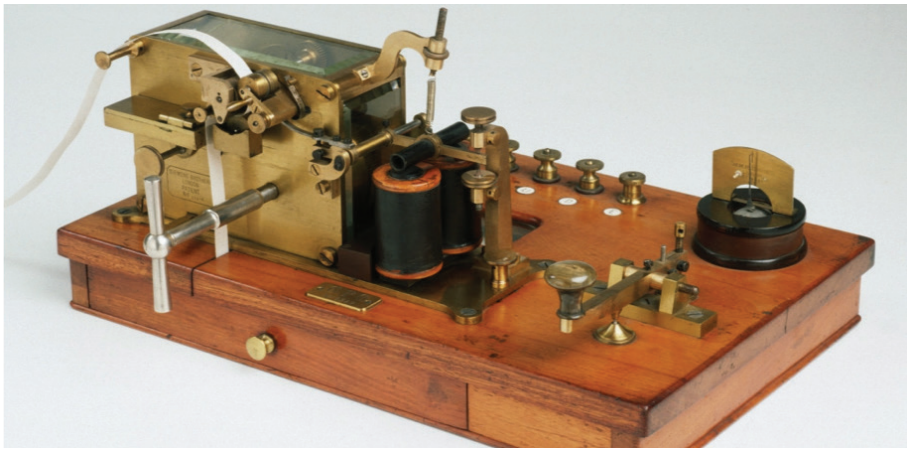
https://www.pbs.org/weta/reconstruction/

https://www.scientificamerican.com/article/how-technology-shaped-the-civil-war-classics/

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.



This illustration highlights how the telegraphy helped distribute information.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story.

A good storyboard depicts significant action and changes. Think about the last good book you read. The author sat down to think about exactly what would happen when.

One of the best ways to do this is to create a series of panels that almost look like a comic book. Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Civil War quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2

1. View of plantation home vs. enslaved quarters.

2. Participant enters enslavement cabin.

Body Panels 3-10

3. View of basic, meager possessions and fireplace.

4. As pans out, view encompasses showing enslaved working in fields.

5. Enslaved shared discussion about a better life and trying to escape.

6. Introduction to the Underground Railroad.

7. Enslaved escaping starts a night outside cabin.

8. Visible at moonlight running parallel to a stream.

9. Participant hides in house as bounty hunters search for runaway.

10. Hides under floorboards.

Climax

11. Someone is at the door. Fear. Heart is pounding.

Summary

12. Escapes through an underground tunnel across border for freedom. Runs in happiness.

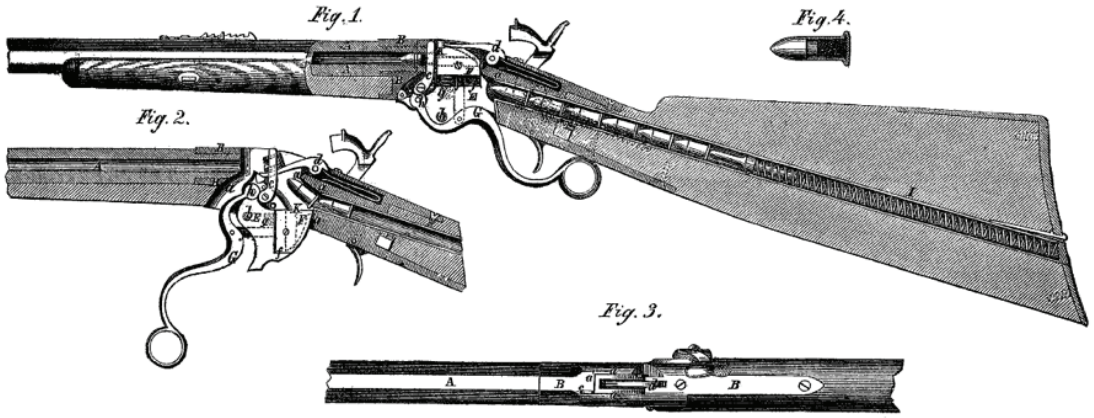
05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest Game Guru software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2-4. Maybe you don't have time to fill rooms with all the right equipment, or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period you are basing the game off of? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?



For example, the repeating rifle is an artifact that shows the internal layout of the weapon.

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Analyzing Classification Connection Cultural Perspective Evaluating Interpreting Analyzing Categorization Comparing Connections Evidence Explicit Text Main Idea/ Central Message Relationships Summarizing	8.1a. Identify different approaches toward and policies for Reconstruction highlight the challenges faced in reunifying the nation. Compare and contrast the differences between Reconstruction under Lincoln's plan, Johnson's plan, and congressional (Radical) Reconstruction. 8.1b Distinguish how freed African Americans created new lives for themselves in the absence of slavery. Constitutional amendments and federal legislation sought to expand the rights and protect the citizenship of African Americans.	Creates and shares reading experiences and responds in a variety of ways and formats. Reads independently. Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words. Recognizes that own point of view influences the interpretation of information. Recognizes the effect of different perspectives and points of view on information. Analyzes disparate points of view discovered in different sources. Draws conclusions based on explicit and implied information. Identifies and uses a variety of technology tools, including Web-based interactive tools, to organize information, create a product, and enhance communication. Seeks balanced view by using diverse sources to access appropriate material. Selects information based on authority and point of view. Compares online resources to seek global perspective Identifies misconceptions and revises ideas as new information is gained. Analyzes disparate points of view discovered in different sources. Recognizes the effect of different perspectives and points of view on information.	1.A1 1.A2 IV.A1 II.A2 IV.A1 IV.A2 IV.A1 II.A2 V.A1 I.D1 III.B1 IV.B1 IV.B4 II.B3	6c 4c 6a 3a 3b 5c 5c 1a 1b 3c 6d 3a 4b 5b

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Analyzing	Examine the Reconstruction amendments (13th, 14th, and 15th) in terms of the rights and protections provided to African Americans.	Recognizes that own point of view influences the interpretation of information.	III.B1	4a
Argument				
Claims		Creates and shares reading experiences and responds in a variety of ways and formats.	VI.C1	4a
Conflicting Viewpoints		Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words.	IV.A2	3d
Evaluating	Examine the Freedmen's Bureau's purpose, successes, and the extent of its success. Examine the effects of the sharecropping system on African Americans.		IV.B4	6d
Evidence		Recognizes that own point of view influences the interpretation of information.	VI.C1	6b
Persuasion		Recognizes the effect of different perspectives and points of view on information.	V.A3	3a
Reasoning				
Analyzing	Examine the reasons for the migration of African Americans to the North. Examine the rise of African Americans in government.	Analyzes disparate points of view discovered in different sources.	III.C2	1c
Categorization		Draws conclusions based on explicit and implied information.	IV.A3	3b
Comparing Connections		Recognizes the effect of different perspectives and points of view on information.	V.A2	4d

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Evidence Explicit Text Main Idea/ Central Message Relationships Summarizing	8.1c Determine federal initiatives begun during Reconstruction were challenged on many levels, leading to negative impacts on the lives of African Americans.	Recognizes that own point of view influences the interpretation of information.	IV.D1	3a
		Analyzes disparate points of view discovered in different sources.	II.D1	6a
		Identifies and uses a variety of technology tools, including Web-based interactive tools, to organize information, create a product, and enhance communication.	II.D2 VI.D1	6d 2c
Analyzing Argument Claims Conflicting Viewpoints Evaluating Evidence Persuasion Reasoning	Explore methods used by Southern state governments to affect the lives of African Americans, including the passage of Black Codes, poll taxes, and Jim Crow laws.	Seeks balanced view by using diverse sources to access appropriate material	V.A1	7a
		Selects information based on authority and point of view.	IV.A1	6d
		Compares online resources to seek global perspective.	IV.A1	6b
		Identifies misconceptions and revises ideas as new information is gained.	IV.A2	4c
	Explore the responses of some Southerners to the increased rights of African Americans, noting the development of organizations such as the Ku Klux Klan and White Leagues.	Analyzes disparate points of view discovered in different sources.	I.D3 IV.D1	1b 1b
		Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information.	VI.C3	3a

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Audience	Examine the ways in which the federal government failed to follow up on its promises to freed African Americans. Examine the effects of the Plessy v. Ferguson ruling.	Creates products for authentic reasons and audiences. Uses two or three strategies to revise product based on self-assessment, teacher feedback, and peer feedback.	V.B2	5c
		Identifies and uses a variety of technology tools, including Web-based interactive tools, to organize information, create a product, and enhance communication.		
Organization		Experiments with various types of multimedia software and online applications for artistic and personal expression. Works collaboratively to develop, publish, and present projects involving 1-2 media that effectively communicate information and ideas about the curriculum to authentic audiences.	VI.C1	5b
Purpose		Gathers and uses information ethically by citing all sources. Credits sources by using correct bibliographic format.	IV.D3	5c
		Revises the question or problem as needed to arrive at a manageable topic for inquiry.		
Analyzing		Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words.	VI.A2	1c
		Plans inquiry to test hypothesis or validate thesis.		

DOK Tags	Next Gen Standards	IFC Standards	AASL	ISTE
Argument				
Character Types	W.8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	Compares information found to tentative thesis or hypothesis; revisits and revises thesis/ hypothesis as appropriate . Refines questions to guide the search for different types of information . Uses different formats as sources of information.	VI.B2	1b
Claims			IV.B2	2c
Evaluating	W.8.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.	Seeks balanced view by using diverse sources to access appropriate material .Selects information based on authority and point of view.	I.A2	6d
Evidence				
Informational Text	a. Apply grade 8 Reading standards to literature (e.g., "Analyze how a modern work of fiction draws on themes, patterns of events, or character types from myths, traditional stories, or religious works such as the Bible, including describing how the material is rendered new").	Compares online resources to seek global perspective.	I.B1	2c
Quotation		Analyzes disparate points of view discovered in different sources.		
Patterns	b. Apply grade 8 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced").	Draws conclusions based on explicit and implied information.	I.B3	1a
Reasoning		Gathers and uses information ethically by citing all sources.	IV.A3	3b
Theme		Credits sources by using correct bibliographic format.		

VR Quest® STEAM Curriculum Guide
9th Grade English

Sugar

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

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Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

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Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
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The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with the informational text, Sugar Changed the World.

As the adage so eloquently states: "reading opens the door to unlimited knowledge." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of sugar as you gain insight into people, colonialism, supply and demand and make meaning of life and the history of slavery. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

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By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of sugar in fostering slavery within a 20 year period
- Determine the early origins of sugar in early history and its impact during a 10 year timeframe
- Create a time line of sugar's over a 300 year time period
- Compare and contrast the development of sugar in America and in India during a 50 year time span

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the Geography of Informational Text:

The globe has a diverse geography and very physical features that make some places receptive to growing sugar and others not. Some countries and natives to those countries suffered miserably as a result of sugar cane greed. Others had their own sources and made it a daily staple. Geographic features greatly influenced who had power, control and the way others would be imprisoned and treated. Additionally, the role of environment, location, natural resources and indigenous plants of certain countries propelled the development of slavery.

- How did the location of sugar cane fields affect what we know as the world today?
- Compare and contrast two countries and the outcome of slavery in those countries.
- Determine the role of Arabic countries in sugar's development.
- Define the different currencies America has used in an infographic.

Know the significance of art, science and technology in relationship to sugar history:

Sugar can be used in art, be colored, used as sand, be course or fine and alter states of matter. As such a diverse and alterable resource, sugar has been used in various art forms. Sugar has also been utilized in science experiments and has different chemical compounds that make studying it informative interesting. Scientifically, sugar has been proven to be addictive and release a hormone reaction after ingesting. Food studies show that sugar affects memory recall, reaction time and cognitive performance. In terms of technology, there are unique implications as to how the refinement process has evolved to meet the needs and demands of sugar usage.

Explain how past practices are current and still used today:

Sugar has an ancient history going back to BC days and tropical regions. Sugar has always been an industry and will continue to make a great deal of money for various different countries. Sugar crops have faced disease and pests, thus affecting their yielding crops. Interestingly, sugar can be cross bred and has many species. Consider how sugar, "the food nobody needs, but everyone craves," has changed the world.

Taking it to the next level with critical thinking:

Sugar is a strong and large part of the U.S. economy. Though many try to do without it, sugar has many forms and roles in the food industry. Sugar is a large money maker. Consider doing a sugar challenge and going without sugar for two weeks. Surprisingly, sugar is in 95% of all man created food from juices, sodas to cereal and health or power bars. The study or timeline of sugar makes for greater reflection into why the US still suffers social justice issues to this day.

- Determine and describe how not seeking the harvesting of sugar would have changed outcomes for U.S. history. What would life be like today? Would social justice be an issue? Would the economy be different? If so, how?
- Identify cause and effect of different methods to releasing dopamine.
- Assess data pertaining to sugar sales, products containing sugar and compare and contrast to vegetables. Construct an infographic showing which costs more per item and which generates more sales.
- Explain how sugar affects your body/health and how to implement a sugar free diet.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of sugar with respect to our economy, social justice issues and growth as a nation provides a wealth of opportunities and challenges to design a quest where players discover better understand how the world and politics truly work. Take time and reflect on the problems and obstacles created by the US trying to dominate the production of sugar. What implications are there is we try to right the wrongs of the past? How would we go about it? Here are a few ideas:

- Tell players to utilize various globes, maps and documents to show the location sugar origins, fields, production and sales throughout the world. Create an infographic disbursing this information.
- Illustrate the specific turning points in history with respect to sugar with a timeline and accompanying audio.
- Create a digital presentation highlighting natural sweetener options and their differences and benefits over sugar.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.livescience.com/4949-sugar-changed-world.html#:~:text=How%20Sugar%20Changed%20the%20World.%20Sugar%2C%20or%20White,even%20helped%20America%20achieve%20independence%20from%20Great%20Britain.

https://www.youtube.com/watch?v=mn4F4yWSU3w

https://www.youtube.com/watch?v=BLzgD11RwEc

https://www.youtube.com/watch?v=3Eui_t8bO_s

https://en.wikipedia.org/wiki/Sugar

https://www.britannica.com/science/sugar-chemical-compound

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

ELA/Accountable Talk Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Explain	Explore	Express	Fluent	Generate
Identity	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method /Representation					

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

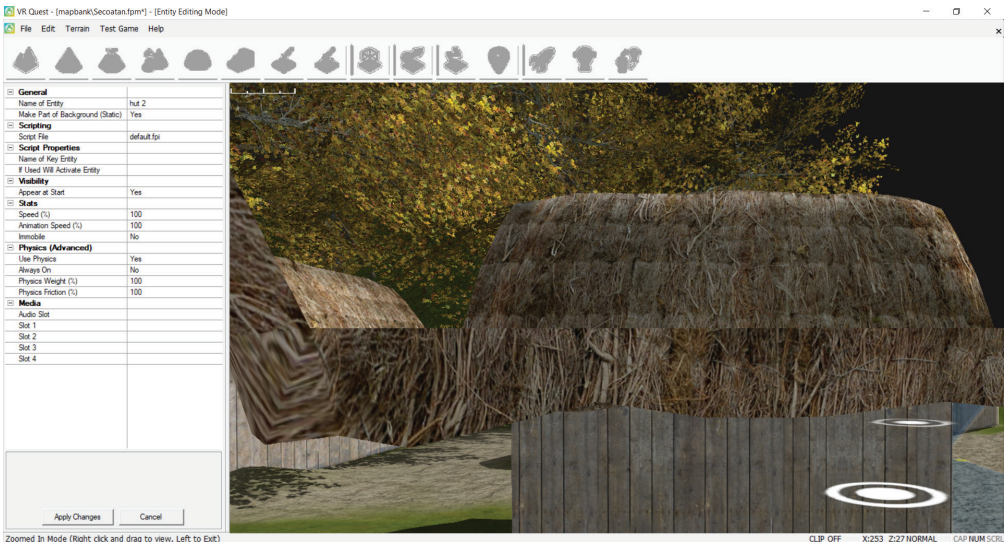
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

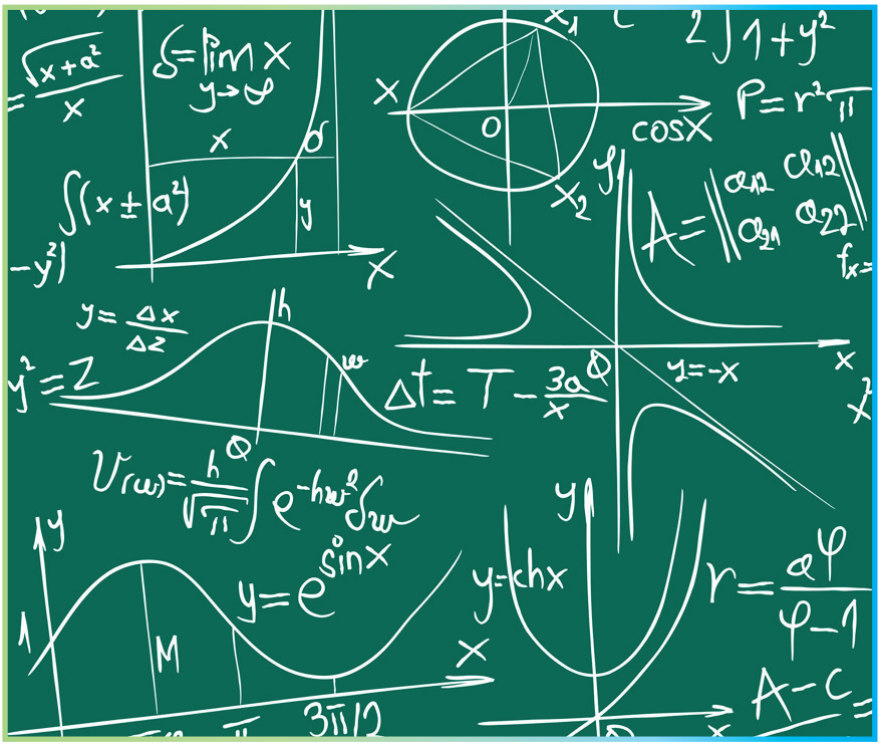
DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	9-10R1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly/implicitly and make logical inferences; develop questions for deeper understanding and for further exploration. 9-10R2: Determine one or more themes or central ideas in a text and analyze its development, including how it emerges and is shaped and refined by specific details; objectively and accurately summarize a text. 9-10R3: Analyze how and why individuals, events, and ideas develop and interact over the course of a text. In literary texts, analyze how complex and/or dynamic characters develop, interact with other characters, advance the plot, or develop a theme. In informational texts, analyze how the author unfolds an analysis or argument, including the sequence, the introduction and development of ideas, and the connections that exist.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts		Identifies facts and details that support main ideas.		
Facts		Follows a model or template provided to complete inquiry project and follows a timeline.	I.D1	3d
Illustrations		Asks questions to clarify topics or details.	I.B1	5c
Informational Texts		Generates a list of keywords for a research-based project with guidance. Uses selected search engines to find appropriate information. Uses pre-selected Web resources to locate information.	IV.C1 V.A1	3c 2b
Key Details		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative		Uses various note-taking strategies.	IV.D1	6a
Opinion		Uses common organizational patterns to organize information.	II.D2	1b
Organization		Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	I.B2	1b
Point of View		Identifies and evaluates the important features for a good product.	I.A2	3c
Quotations		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.	VI.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events**	9-10R4: Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings. Analyze the impact of specific word choices on meaning, tone, and mood. Examine technical or key terms and how language differs across genres.			
	9-10R5: In literary texts, consider how varied aspects of structure create meaning and affect the reader. In informational texts, consider how author's intent influences particular sentences, paragraphs, or sections.			
	9-10R6: Analyze how authors employ point of view, perspective, and purpose to shape explicit and implicit messages (e.g., examine rhetorical strategies, literary elements and devices).			
	9-10R7: Analyze how a subject/content is presented in two or more formats by determining which details are emphasized, altered, or absent in each account. (e.g., analyze the representation of a subject / content or key scene in two different formats, examine the differences between a historical novel and a documentary).	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information.	III.C2	6d
Audience **Organization**	9-10R8: Delineate and evaluate an argument and specific claims in a text, assessing the validity or fallacy of key statements by examining whether the supporting evidence is relevant and sufficient.	Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others.	III.B2	6a

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	9-10R9: Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences.	Drafts the presentation/product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
9th Grade Math

Algebra 1



Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into Algebra, a world of math. As the adage so eloquently states: "Life is a math equation. In order to gain the most, you have to know how to convert negatives into positives."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text. Prepare to travel through the world of Algebra and mathematics as you gain insight into recognizing common occurrences and everyday implications of math in our world.

Besides being intertwined in reasoning and philosophy, understanding Algebra and analyzing different forms of equations help make meaning of simple things like budgets and fitness to more complex topics like engineering, economics and finance. As you begin to develop a foundation in this math journey, you will be able to explain and analyze mathematical principles while solving problems.

In this quest, you create an adventure or museum gallery walk centered on Algebraic equations. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain why Algebra matters and how it affects real life scenarios in economics, science and/ or government over a specific time span.
- Critique five correct proportions necessary for architecture or art masterpieces with reference to specific time periods being studied.
- Define the amount of time, money and distance needed to arrive at your morning destination by way of your daily routines (how much prep time do you need, time/ cost for breakfast, time needed to gather school/work essentials, how much traffic is encountered and how it affects your time) by way of Algebraic equation within a certain time span.
- Determine the Algebraic equations needed to calculate profit / loss of a business or investment during a specific time period.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire math-based artifacts, explain parameters of equations or combat math challenges in order to break out of a breakout room, confinement or area. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select; an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

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Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

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If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess and exposing algebraic equations:

The understanding of Algebra aids in logical thinking. Algebraic dispositions provide insight into breaking down problems and determining solutions. Learning and practicing Algebra routinely will train the diligent to think critically. The ability to logically think instills mindful habits not just in academics, but also in everyday life and decision making.

- Quantitively reason while using units to solve problems by guiding and interpreting the solutions of multi-step problems with visuals (scale, data displays and graphs).
- Recognize and interpret the structure of expressions representing a quantity in terms of context and identifying various ways to rewrite it.
- Represent expressions in equivalent forms to reveal their characteristics and properties of exponents to rewrite exponential expressions.
- Create inequalities and equations in one and in two variable(s) to represent real world context.
- Utilizing the same reasoning to solve equations, rewrite formulas to highlight quantities of interest.
- Explain the process of reasoning in solving equations.

Know the significance of art, science and technology throughout the United States of America's history:

Interestingly, careers in the science of finance or the financial sector often represent work Algebraically. For example, interest rate and exchange rates are usually represented through Algebra. Chemical and physical sciences are founded on basic Algebraic equations. The fundamentals of both art and architecture employ Algebra or calculating exact proportions. Smart devices, modern cars, flat screen TVs all rely on Algebra to perform and function well. For example, computer games have characters and presets, which are all actually strings of symbols. A computer programmer utilizes a working knowledge of Algebra to create strings of symbols that perform the desired result. Additionally, in order for the symbols to interact correctly, mathematical rules must be followed, which requires the use of Algebra.

Explain how past practices are current and still used today:

Define how baking, cooking and measuring ingredients as Algebraic equations. In the U.S., Fahrenheit is typically used as the standards in recipes, science and weather. Temperatures in some recipes are given in European standards of Celsius and would have to be converted if used on American made appliances. Meat must be cooked by weight. Thus, something like a turkey's cooking time can be calculated using Algebraic equations. Utilizing an Algebraic equation, one can calculate how long it would take to thaw a 20-pound turkey since every 5 pounds takes 24 hours to thaw.

Additionally, projects like home repairs and landscaping have always required a strong sense of Algebra. Calculating length, height, breadth, volume are basic Algebra operations.

Anything from calculating the required amount of square feet and tiles needed for a new floor or the amount of paint needed for a room's walls are all Algebra problems.

Taking it to the next level with critical thinking:

Physical environment has influenced human activities and development throughout history. Beyond improving our surroundings, Algebraic knowledge is also beneficial to emotional, spiritual and mental wellbeing considering different aspects of health and wellness.

- Determine and describe BMI (Body Mass Index) while calculating calories or food intake
- Identify other equations that can be used to calculate body fat percentage
- Assess different types repetitions and sets with respect to weight needed to train on a personal weight loss or muscle building journey
- Investigate the relevance of how to apply Algebraic equations in sports. In all ball based and goal oriented sports, an Algebraic equation of distance and force required to score can be calculated with respect to speed needed to cover a specific area.
- Explain how individuals in positions of power utilize Algebraic equations. Does Algebra have a place in social situations? Can it help to provide greater equity? Explain and give examples.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Investigating the origins and history of Algebra provide a comprehensive understanding and a solid appreciation of its roots. Going back to Babylonians and Greeks, what began as an advanced arithmetic system is what we call Algebra today. The three forms of Algebraic expressions are defined by types of functions and operations, positioning of variables and the behavior of the graphs (monomial, binomial and polynomial expression). Keeping those key components in mind, think of ways to add depth to your virtual reality game. Here are a few ideas:

- Make observations in how Algebraic equations are essential in deciphering and comprehending musical notes and the arts.
- Construct examples of the behavior of gases, solids and liquids and / or the forces of gravity since they all extensively use Algebra.
- Formulate expenses on a shopping trip by assigning alphabetic symbols and calculating total expenditure by categorizing distinct values of all.
- Create a museum gallery walk of key people utilized Algebra for an intellectual, economic, social or mental edge. What did it help them accomplish and why is it relevant?

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.syvum.com/exam/regents/Algebra_I/

https://www.khanacademy.org/math/Algebra

https://www.onlinemathlearning.com/grade9-Algebra-word-problems.html

https://study.com/learn/ninth-grade-math-worksheets.html

https://www.youtube.com/watch?v=heeHYVl-cYI

https://govalor.com/wp-content/uploads/Algebra-Practice-Test.pdf

https://bit.ly/3ewzARN

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Math Vocabulary Word Wall

Coefficients	Derivative	Domain	Equation
Exponentials	Factoring	Inequality	Integer
Irrational	Linear	Notation	Quadratic
Polynomials	Rational	Variable	

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Expain	Explore	Express	Fluent	Generate
Identify	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method/ Representation					

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

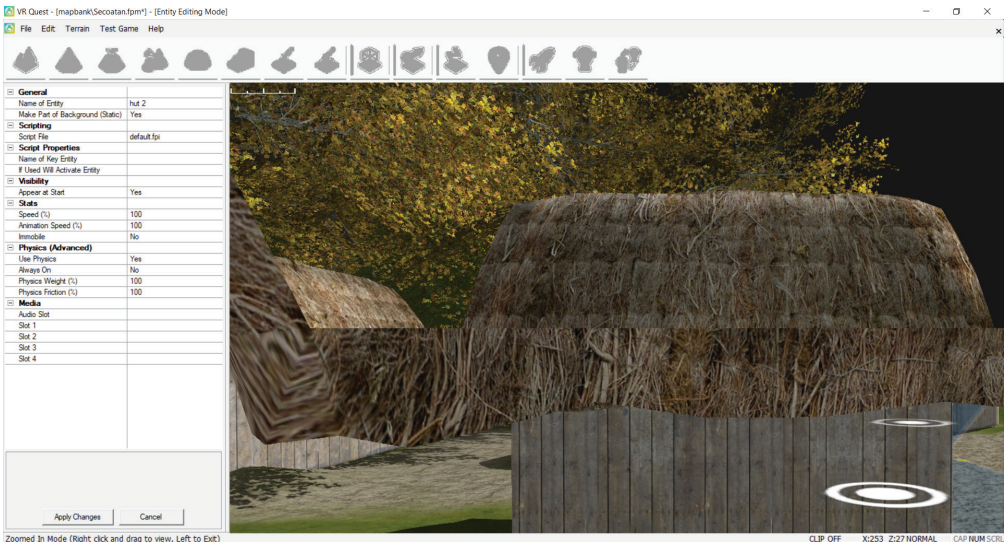
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective **Domain Specific Vocabulary** **Explanatory Texts** **Facts** **Illustrations** **Informational Texts** **Key Details** **Narrative** **Opinion** **Organization** **Point of View**	AI-N.RN.3 Use properties and operations to understand the different forms of rational and irrational numbers. a.) Perform all four arithmetic operations and apply properties to generate equivalent forms of rational numbers and square roots. b.) Categorize the sum or product of rational or irrational numbers. • The sum and product of two rational numbers is rational. • The sum of a rational number and an irrational number is irrational. • The product of a nonzero rational number and an irrational number is irrational. • The sum and product of two irrational numbers could be either rational or irrational. AI-N.Q.1 Select quantities and use units as a way to: i) interpret and guide the solution of multi-step problems; ii) choose and interpret units consistently in formulas; and iii) choose and interpret the scale and the origin in graphs and data displays. AI-N.Q.3 Choose a level of accuracy appropriate to limitations on measurement and context when reporting quantities.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience. Distinguishes between fact and opinion. Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details. Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information. Uses pre-selected Web resources to locate information. Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions. Uses various note-taking strategies. Uses common organizational patterns to organize information. Uses pre-writing to brainstorm ideas for most effective way to present conclusions. Identifies and evaluates the important features for a good product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.	I.A1 V.A2 I.D1 I.B1 IV.C1 V.A1 III.B1 IV.D1 II.D2 I.B2 I.A2	3d 1b 3d 5c 3c 2b 3d 6a 1b 1b 3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Quotations **Reasoning** **Sequence of Events** **Audience**	AI-A.SSE.1 Interpret expressions that represent a quantity in terms of its context. AI-A.SSE.1a Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient, and constant term. AI-A.SSE.1b Interpret expressions by viewing one or more of their parts as a single entity. AI-A.SSE.2 Recognize and use the structure of an expression to identify ways to rewrite it. AI-A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. AI-A.SSE.3c Use the properties of exponents to rewrite exponential expressions. AI-A.APR.1 Add, subtract, and multiply polynomials and recognize that the result of the operation is also a polynomial. This forms a system analogous to the integers. AI-A.CED.1 Create equations and inequalities in one variable to represent a real-world context. AI-A.CED.2 Create equations and linear inequalities in two variables to represent a real-world context. AI-A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.	Paraphrases and summarizes information that answers research questions.	VI.A2 III.C2	3c 6d

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Organization **Purpose**	AI-A.REI.1a Explain each step when solving a linear or quadratic equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. AI-A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. AI-A.REI.6a Solve systems of linear equations in two variables both Algebraically and graphically. AI-F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation/product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	III.B2 VI.C2	6a 7b

VR Quest® STEAM Curriculum Guide
9th Grade Social Studies

The Rise and Fall of the Roman Empire

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve – all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Additionally, the VR Quest STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® has the ability to showcase different cultures and heritages as valued assets to learning and offer an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest Level Design Screen

The Journey Begins

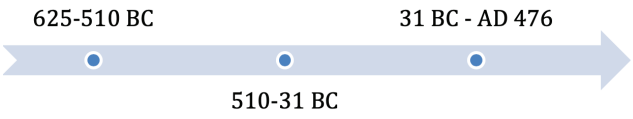
Now put on your seatbelts and get ready for a fun-filled ride. Using the latest technology, Virtual Reality now places you in control of your journey into the past. VR Quest software utilizes simple yet powerful tools to re-create scenes from history. Example levels are provided to demonstrate the capability of the software to place the user into a simulated environment designed around an event or locale.

The experience is complete with detailed stereographic 3D buildings, objects and characters surrounding the user as they are placed inside a new world to explore. Sounds, images, videos and special effects all add to the suspension of disbelief providing a nearly tangible reality. The idea of "You are there" is reinforced as the user reacts to the simulation much as they would in the real world by naturally looking around and moving effortlessly to explore new locations or examine in detail specific areas of interest.

The Rise and Fall of the Roman Empire

Prepare to travel through the Roman period from its beginnings, height of power and eventual decline.

The history of the Roman Empire can be divided into three district periods:



625-510 BC Period of Kings

The first period in Roman history is known as the Period of Kings, and it lasted from Rome's founding until 510 BC. During this brief time Rome, led by no fewer than six kings, advanced both militaristically and economically with increases in physical boundaries, military might, and production and trade of goods including oil lamps. Politically, this period saw the early formation of the Roman constitution. The end of the Period of Kings came with the decline of Etruscan power, thus ushering in Rome's Republican Period.

In this sub-quest, you create an adventure that displays the early Roman settlements under the rule of the Etruscan Kings. Who were the Etruscans? What role did the Etruscan's play in transforming early Rome from a huddle of villages into a city? Rome had not yet developed into a Republic. Explain what advancements Rome made during this time period in the form of government, architecture, engineering and civil rights. During this period of Kings, the first market/meeting place, the Forum Romanum, was established on drained marshlands. The Forum became the heart of city and later of the empire. The first census was established as well as the beginnings of a government based on an advisory council known as the Senate.

510-31 BC The Founding of the Republic

Rome entered its Republican Period in 510 BC. No longer ruled by kings, the Romans established a new form of government whereby the upper classes ruled, namely the senators and the equestrians, or knights. However, a dictator could be nominated in times of crisis. In 451 BC, the Romans established the "Twelve Tables," a standardized code of laws meant for public, private, and political matters.

Rome continued to expand through the Republican Period and gained control over the entire Italian peninsula by 338 BC. It was the Punic Wars from 264-146 BC, along with some conflicts with Greece, that allowed Rome to take control of Carthage and Corinth and thus become the dominant maritime power in the Mediterranean.

Soon after, Rome's political atmosphere pushed the Republic into a period of chaos and civil war. This led to the election of a dictator, L. Cornelius Sulla, who served from 82-80 BC. Following Sulla's resignation in 79 BC, the Republic returned to a state of unrest. While Rome continued to be governed as a Republic for another 50 years, the shift to Imperialism began to take shape in 60 BC when Julius Caesar rose to power.

By 51 BC, Julius Caesar had conquered Celtic Gaul and, for the first time, Rome's borders had spread beyond the Mediterranean region. Although the Senate was still Rome's governing body, its power was weakening. Julius Caesar was assassinated in 44 BC and replaced by his heir, Gaius Julius Caesar Octavianus (Octavian) who ruled alongside Mark Antony. In 31 BC Rome overtook Egypt which resulted in the death of Mark Antony and left Octavian as the unchallenged ruler of Rome. Octavian assumed the title of Augustus and thus became the first Emperor of Rome.

In this sub-quest, you create an adventure that navigates through the expansion of Imperialist Rome beyond its borders, the gradual transition of the Republic towards a dictatorship, the forming of the Triumvirate and achievements in science, architecture and engineering.

31 BC – AD 476 Imperial Rome

Rome's Imperial Period was its last, beginning with the rise of Rome's first emperor in 31 BC and lasting until the fall of Rome in AD 476. During this period, Rome saw several decades of peace, prosperity, and expansion. By AD 117, the Roman Empire had reached its maximum extant, spanning three continents including Asia Minor, northern Africa, and most of Europe.

In AD 286 the Roman Empire was split into eastern and western empires, each ruled by its own emperor. The western empire suffered several Gothic invasions and, in AD 455, was sacked by Vandals. Rome continued to decline after that until AD 476 when the western Roman Empire came to an end. The eastern Roman Empire, more commonly known as the Byzantine Empire, survived until the 15th century AD. It fell when Turks took control of its capital city, Constantinople (modern day Istanbul in Turkey) in AD 1453.

A period of peace, prosperity, and cultural achievements can be designated as a Golden Age.

Compare and contrast the achievements of the three periods and determine which period(s) Rome's Golden Age.

In this sub-quest, you great an adventure that navigates through Rome's greatest expansion period and its decline. How did the Roman Empire split in western and eastern empires? What were the accomplishments of the Roman Civilization during this time period? What were the main factors contributing to the decline of the Empire?

While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Defining the Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.
Here is a sample **SMART** objective:

Here is a sample SMART objective:
Players will be able to:

- Apply the principal of cause and effect to explain the rise and fall of the Roman Empire.
- Describe how the army transformed Rome as an imperial power.
- List some of the major contributions of the Roman Empire to civilization.
- Name influential emperors that contributed to the growth of the Rome.
- Summarize the primary influence of the Roman concept of elected officials and division of government branches on modern government and democracy.
- Outline the migration of Barbarian Tribes into Roman territory and eventual invasion of Rome itself.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Know the key factors that resulted in the rise and fall of the Roman Empire:

Factors included territorial, economic, political and religious. The rise and fall was not a single event. As Rome was a part of what is modern Italy, it had no natural resources and was able to conquer such a large empire because of the superb discipline and organization of its armies. In the case of conquering Egypt, it relied on the abundant grain production along the Nile River to feed population and its armies.

Some factors attributing to the decline were invasions by barbarian tribes, financial crises due to overspending and constant wars, overexpansion of territory, government corruption and political instability.

Know the significance of science, technology, engineering, arts and mathematics:

Romans were great engineers and constantly strived to master the natural environment and test the limits of Physics. Aqueducts were huge building projects that employed many engineering tricks to aid water flow and increase purity (examples: mesh filters and settling tanks). Tunnels were constructed to provide more direct routes for aqueducts and roads and excavated with surveying precision to enter and exit a mountain at precisely the desired spot. Watermills harnessed waterpower from rivers using sophisticated systems of wheels and gears and used the energy gained to drive mills for flour production, for saws to cut marble, or as ore crushers in search of precious metals.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The Roman Empire gives you a wealth of opportunities and challenges to design a quest where players discover more about this time period in Global History as they employ critical thinking and problem solving. Here are a few ideas:

- Challenge players to create a detailed museum walk of the cultural, artistic, science and technology artifacts that is narrated by prominent figures of that era.
- Display the different time segments in the Roman Empire to highlight advancements during this period.

Principal Players in Roman Society

Emperor

Senators (Politicians)

Roman Legionnaire (Soldier)

Plebeians (Lower Class Citizens)

Patricians (Upper Class Citizens)

Barbarian Tribes

Word Wall

Apply major terms and vocabulary in your quest.
Examples of vocabulary that can be applied to your storyboard:

- Republic
- Veto
- Magistrate
- Senate
- Patrician
- Plebeian
- Tribune
- Legion
- Triumvirate
- Inflation
- Province
- Tetrarch
- Abdication
- Persecution
- Bishop
- Hierarchy
- Heresy
- Missionary
- Barbarian
- Census
- Forum

Websites for Student Use

Here are a few vetted websites to help you conduct research:

http://www.bbc.co.uk/schools/primaryhistory/romans/

http://www.pbs.org/empires/romans/index.html

http://www.museumoflondon.org.uk/Resources/learning/digging/index.html

http://www.nms.ac.uk/kids/people_of_the_past/discover_the_romans.aspx

http://ic.galegroup.com/

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story.

A good storyboard depicts significant action and changes. Think about the last good book you read. The author sat down to think about exactly what would happen when.

One of the best ways to do this is to create a series of panels that almost look like a comic book. Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

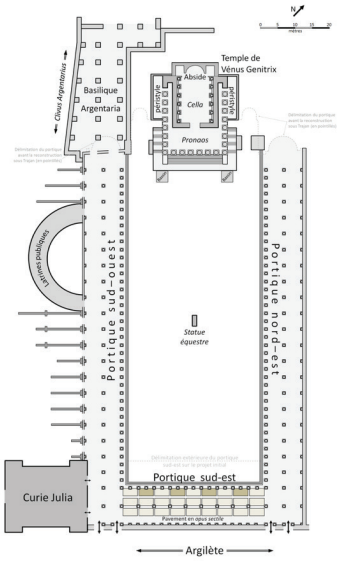
In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found.

The Forum of Julius Caesar

For this sample quest, we've chosen to recreate the Forum of Julius Caesar. Julius Caesar was the first Roman Emperor. He was a great General in battle and after a successful campaign in the region called Gaul, he returned to Rome and took over the government in a military coup. He proclaimed himself Emperor and began his reign. He created many building projects and one was expansion of the Forum Romanum.

During the battle in Gaul, Caesar prayed to the Goddess Venus and proclaimed he would build a temple in honor of her if he won. He did and built an amazing complex called the Temple of Venus Genetrix in front of a huge courtyard – this became known as "The Forum of Julius Caesar."



This forum became the center of government for the new Roman Empire. The Senate met there to hold discussions and make laws concerning the people. It was also a place where people could gather to hear speeches. Julius Caesar would later be killed nearby.

In brainstorming how we might show the forum, we researched how the location looks like today.

There are many ruins of buildings from later years as well as modern streets and buildings nearby. It's still very impressive to think that a person who visits this place is walking among the actual structures that existed thousands of years ago.

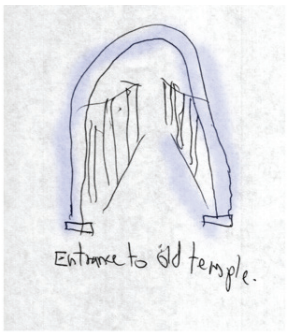
The biggest question is if this place looks like it does now, how did it look like back then? Ah ha! That is an inspiration for the Quest. We could build an area that looks like the current Roman Forum and then when the player walks through a magic portal, it could transport them to the past – back to the original forum as it looked just after Julius Caesar constructed it.

The first thing after brainstorming and research is to draw a simple storyboard of what the player might see when they start the level.

On the following page is a sample storyboard for the experience.

Sample Storyboard for VR Quest®

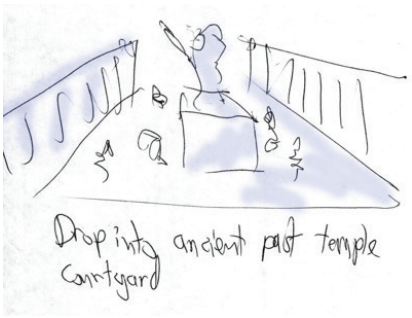
Introduction Panels 1 and 2



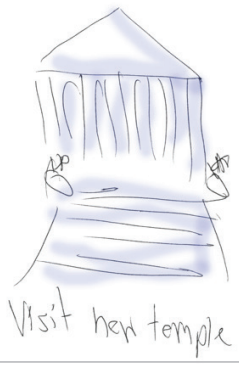
1. Start with Player entering through the archway to the old ruins.

2. Walk near the old pillars of the Temple of Venus.

Body Panels 3-10



3. After entering the portal, drop into the original courtyard of the Forum.



4. Walk across to visit the Temple of Venus Genitrix.

5.

6.

7.

8.

9.

10.

Climax

11.

Summary

12.

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2-4. Maybe you don't have time to fill rooms with all the right equipment, or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

View from the first scene of the modern ruins.

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take It Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

The Temple of Venus Genitrix
in the Forum of Julius Caesar

Curricular Alignment

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Analyzing Classification Connection Cultural Perspective	RL.9-10.11c Interpret, analyze, and evaluate narratives, poetry, and drama, aesthetically and ethically by making connections to: other texts, ideas, cultural perspectives, eras, personal events and situations.	Creates and shares reading experiences and responds in a variety of ways and formats. Reads independently. Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words. Recognizes their point of view influences the interpretation of information. Recognizes the effect of different perspectives and points of view on information.	1.A1 1.A2 IV.A1 II.A2	6c 4c 6a 3a
Evaluating Interpreting Analyzing Categorization	a. Self-select text to respond and develop innovative perspectives. b. Establish and use criteria to classify, select, and evaluate texts to make informed judgments about the quality of the pieces. RI.9-10.1. Cite strong and thorough textual evidence to support analysis of the what the text says explicitly as well as inferences drawn from the text.	Analyzes disparate points of view discovered in different sources. Draws conclusions based on explicit and implied information. Identifies and uses a variety of technology tools, including Web-based interactive tools, to organize information, create a product, and enhance communication.	IV.A1 IV.A2 IV.A1 II.A2	3b 5c 5c 1a
Comparing Connections Evidence Explicit Text Main Idea/ Central Message	RI.9-10.2. Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.	Seeks balanced view by using diverse sources to access appropriate material. Selects information based on authority and point of view. Compares online resources to seek global perspective Identifies misconceptions and revises ideas as new information is gained.	V.A1 I.D1 III.B1 IV.B1	1b 3c 6d 3a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Relationships Summarizing Analyzing Argument	RI.9-10.2. Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text. RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Analyzes disparate points of view discovered in different sources. Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information. Creates and shares reading experiences and responds in a variety of ways and formats. Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words.	IV.B4 II.B3 III.B1 VI.C1	4b 5b 4a 4a
Claims Conflicting Viewpoints Evaluating	RI.9-10.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.	Recognizes that own point of view influences the interpretation of information. Recognizes the effect of different perspectives and points of view on information.	IV.A2 IV.B4 VI.C1	3d 6d 6b
Evidence Persuasion Reasoning Analyzing	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Analyzes disparate points of view discovered in different sources. Draws conclusions based on explicit and implied information.	V.A3 III.C2 IV.A3	3a 1c 3b

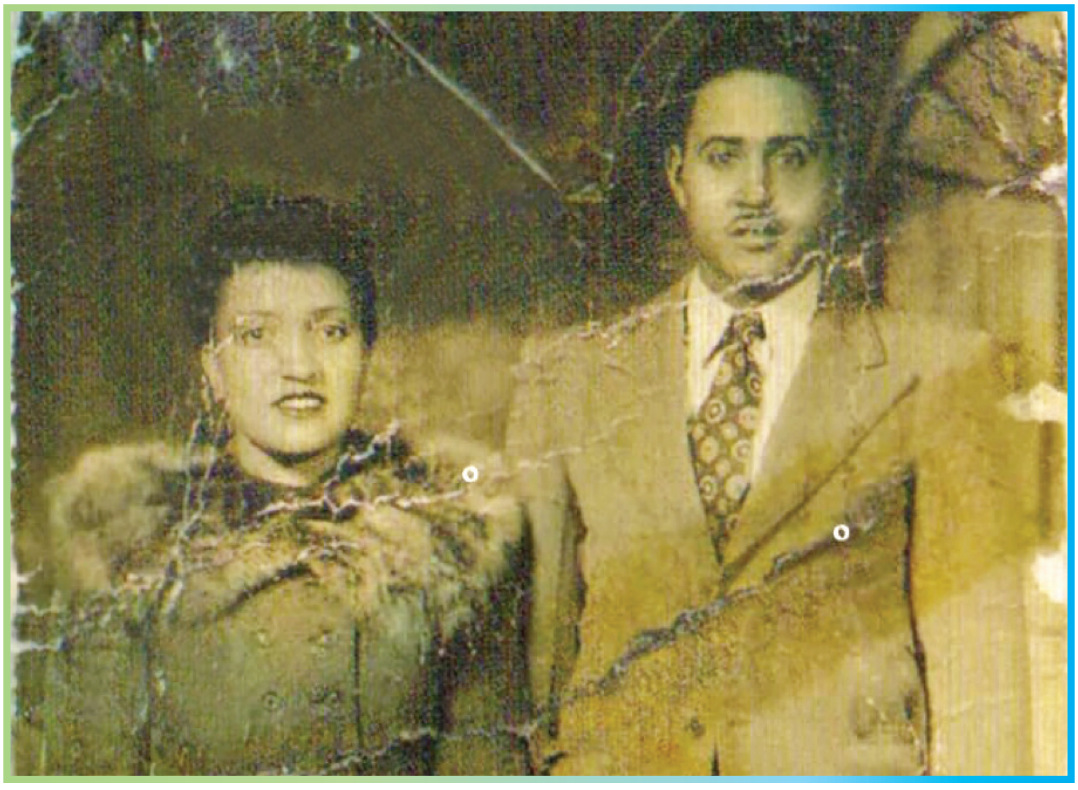
DOK Tags	Common Core	IFC Standards	AASL	ISTE
Categorization Comparing Connections Evidence Explicit Text	RI.9-10.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information.	V.A2 IV.D1	4d 3a 6a
Main Idea/ Central Message Relationships Summarizing	RI.9-10.2. Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.	Analyzes disparate points of view discovered in different sources.	II.D1 II.D2 VI.D1	6a 6d 2c
Analyzing Argument Claims	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Identifies and uses a variety of technology tools, including web-based interactive tools, to organize information, create a product, and enhance communication. Seeks balanced view by using diverse sources to access appropriate material.	V.A1 IV.A1 IV.A1	7a 6d 6b
Conflicting Viewpoints Evaluating Evidence Persuasion Reasoning	RI.9-10.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning. RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Selects information based on authority and point of view. Compares online resources to seek global perspective. Identifies misconceptions and revises ideas as new information is gained. Analyzes disparate points of view discovered in different sources. Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information.	IV.A2 I.D3 IV.D1 VI.C3	4c 1b 1b 3a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Audience	W.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	Creates products for authentic reasons and audiences. Uses two or three strategies to revise product based on self-assessment, teacher feedback and peer feedback. Identifies and uses a variety of technology tools, including web-based interactive tools to organize information, create a product, and enhance communication. Experiments with various types of multimedia software and online applications for artistic and personal expression. Works collaboratively to develop, publish and present projects involving 1-2 media that effectively communicate information and ideas about the curriculum to authentic audiences.	VB2	5c
Organization Purpose	W.9-10.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. W.9-10.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	Gathers and uses information ethically by citing all sources. Credits sources by using correct bibliographic format. Revises the question or problem as needed to arrive at a manageable topic for inquiry. Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words. Plans inquiry to test hypothesis or validate thesis.	VI.C1 IV.D3	5b 5c

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Analyzing Argument	W.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Compares information found to tentative thesis or hypothesis; revisits and revises thesis/hypothesis as appropriate. Refines questions to guide the search for different types of information. Uses different formats as sources of information.	VI.A2 VI.B2	1c 1b
Character Types Claims Evaluating Evidence	W.9-10.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. W.9-10.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.	Seeks balanced view by using diverse sources to access appropriate material. Selects information based on authority and point of view. Compares online resources to seek global perspective. Analyzes disparate points of view discovered in different sources.	IV.B2 I.A2 I.B1	2c 6d 2c
Informational Text Quotation Reasoning Theme	a. Apply grades 9–10 reading standards to literature (e.g., "Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]"). b. Apply grades 9–10 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning").	Draws conclusions based on explicit and implied information. Gathers and uses information ethically by citing all sources.	I.B1 I.B3 IV.A3	2c 1a 3b

VR Quest® STEAM Curriculum Guide
10th Grade English

Immortal Life



Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with the informational text, The Immortal Life of Henrietta Lacks. As the adage so eloquently states: "reading opens the door to unlimited knowledge." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of science and human relations as you gain insight into people, science, privacy laws, racial conflict and disparities in health care due to poverty and race. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure in literacy and informational text or a learning walk. The graphic on the following pages outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order.

While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of disparities in health care due to race and poverty from 1945-1955
- Determine the racial, economic and political climate during Lacks' last seven years
- Create a timeline of civil right within a 75 year time period
- Compare and contrast the segregation in America and apartheid in South Africa during a 50 year time span

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of information text in our environment:

Possessing a solid ability to integrate informational text is key in all disciplines in life. From utilizing mapping skills, reading directions to assembling furniture, informational knowledge builds skills and it a practical to have in personal and professional toolkit. Reading and comprehension is an essential part of living and existing in a modern world, as well as a global economy.

- Identify five ways informational text can save your life.
- Define different modes of informational text you come across in a day.
- Construct an argument as if Lacks was your mother. What would you say to the doctor, the medical professionals and the for profit companies that benefited from her cells?

Know the significance of art, science and technology with respect to informational text:

Information text provides the arts and science with a firm foundation and various approaches for disseminating their work. From the pamphlets, posters and sites detailing art and its history, to complicated medical texts, informational texts have a strong hold on many readers. Writers have been known to find steady work compiling manuals for tech gadgets, machinery or appliances. From the art of firefighting to the love of Picasso, informational texts is helpful, necessary and is a skill needed for mastery by all graduating high school seniors in the U.S.

Explain how past practices are current and still used today:

Define how past theories, practices and stereotypes came into play in the medical field. From 1929 to 1974, countless Latina, Native American and African American women have been unknowingly sterilized. This was named the Eugenics Program. In 1977 this program was eliminated; however, legislation allowing involuntary sterilization stayed on the books until 2003. The Tuskegee experiment (1932-1972), conducted by the US Public Health, deliberately injected poor African American men with syphilis for research purposes. This was nonconsensual and victims were told they were receiving "treatment" because they had "bad blood." Of the 399 injected men, only 74 lived at the end of the experiment and 40 wives and 19 children were subsequently infected as well.

Additionally, there have been too many chemical, radioactive and biological warfare tests done on poor, uncommenting, nonwhite participants. Some of these tests were done by the military, the US government, state prisons or big corporations like Johnson & Johnson and Dow Chemical. At the end of the day, the question remains of what is unknowingly being tested on victims today.

Taking it to the next level with critical thinking:

Lacks and her DNA and cells have significantly influenced the environment, privacy concerns and ethical groups since her contribution was made public. Some people are very divided and whether or not her family has a say, should be diligent or not care. By investigating both sides, hypothesize the medical implications if Lacks cells were never used.

- Why or why not should the doctors have asked for Lacks' permission?
- Determine if lack of education and poverty contributed to the total disregard for privacy and consent shown Lacks?
- Compare and contrast the question of ethics and the beneficial outcome to others. What observations and assumptions do you make and why?
- Assess ethical implications when cells were taken without consent.
- Investigate whether or not Lacks' family should be entitled to profits made of research that used her cells.
- Define emotional challenges faced by all involved parties.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of race with regard to everyday issues. Recently in the news, many situations have developed where people of color have been treated differently and often in a rude and hostile manner. There have been instances of shopping interactions, bird watching in Central Park, an owner painting his outside property, a child selling lemonade, a woman working out in San Francisco, a doctor visiting his parents where people are challenged for being in places.

Thus, the Karen and Ken memes have sprung up. According to dictionary.com, calling a woman a Karen is defined as:

"a pejorative slang term for an obnoxious, angry, entitled, and often racist middle-aged white woman who uses her privilege to get her way or police other people's behaviors."

A Ken is the white male counterpart behaving in the same regard. As a nation, America needs to welcome the opportunities and challenges to discover how to better understand our complicated racial history and strive to do better. People of color often face discrimination and many obstacles throughout their lives. Take time to reflect and align the points indicated below:

- Tell players to utilize various globes, maps and documents to show the location of Lacks and other key African Americans "donors" to the history of the medical field. The Tuskegee Experiment is one example. Create a timeline of these incidents. What affect did their contributions have immediately and in the future?
- Professional and political conditions influence thought leaders and developments made in medicine. Illustrate the specific instances in history with respect to major medical highlights and discoveries that were documented with the unwitting assistance of African Americans.
- Create a museum gallery walk of contributions, timelines and historical notes of Lacks and other key African Americans that unwittingly helped the medical field make advances.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://commons.princeton.edu/livinglaboratories/2016/10/19/henrietta-lacks-immortal-cells-and-racial-conflicts/

https://www.theatlantic.com/entertainment/archive/2010/02/henrietta-lacks-and-race/35286/

https://www.theguardian.com/world/2013/mar/31/henrietta-lacks-cancer-research-genome

https://today.uconn.edu/2015/09/confronting-issues-of-race-in-the-medical-community/#:~:text=Growing%20up%20in%20a%20segregated%20health%20care%20community,Hopkins%20Hospital%2C%20created%20wards%20specifically%20for%20black%20patients.

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitive Accountable Talk Extension Stems

Based on the evidence . . .

The key information indicates/identifies/explains . . .

This reminds me of . . .

This is relevant because . . .

In summary, this means . . .

To expand/piggyback off of what _____ said . . .

I infer this represents . . .

I used to think_____, but now_____ . . .

What's important here is . . .

It's interesting that . . .

One thing we should notice is . . .

One thing we haven't considered is . . .

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

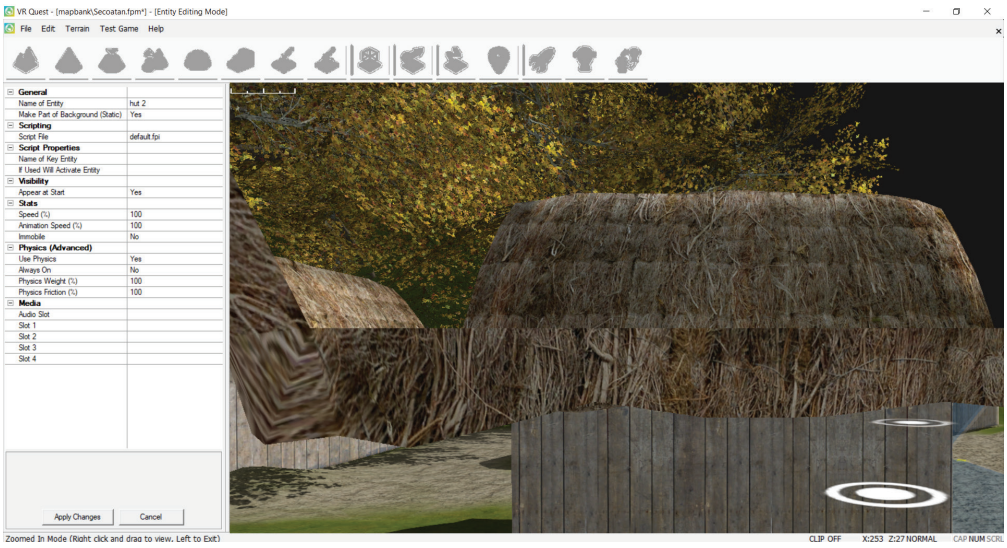
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
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Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

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Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	9-10R1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly/implicitly and make logical inferences; develop questions for deeper understanding and for further exploration.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts		Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts			I.B1	5c
Illustrations	9-10R2: Determine one or more themes or central ideas in a text and analyze its development, including how it emerges and is shaped and refined by specific details; objectively and accurately summarize a text.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	3c
Informational Texts		Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details	9-10R3: Analyze how and why individuals, events, and ideas develop and interact over the course of a text. In literary texts, analyze how complex and/or dynamic characters develop, interact with other characters, advance the plot, or develop a theme. In informational texts, analyze how the author unfolds an analysis or argument, including the sequence, the introduction and development of ideas, and the connections that exist.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative		Uses various note-taking strategies.	IV.D1	6a
Opinion		Uses common organizational patterns to organize information.	II.D2	1b
Organization		Uses pre-writing to brainstorm ideas for most effective way to present conclusions. Identifies and evaluates the important features for a good product.	I.B2	1b
Point of View	9-10R4: Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.A2	3c
Quotations		Restates ideas of others accurately and adds own perspective.	VI.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning	Analyze the impact of specific word choices on meaning, tone, and mood. Examine technical or key terms and how language differs across genres.			
Sequence of Events	9-10R5: In literary texts, consider how varied aspects of structure create meaning and affect the reader. In informational texts, consider how author's intent influences particular sentences, paragraphs, or sections.			
Audience	9-10R6: Analyze how authors employ point of view, perspective, and purpose to shape explicit and implicit messages (e.g., examine rhetorical strategies, literary elements and devices).			
Organization	9-10R7: Analyze how a subject / content is presented in two or more formats by determining which details are emphasized, altered, or absent in each account. (e.g., analyze the representation of a subject/ content or key scene in two different formats, examine the differences between a historical novel and a documentary). 9-10R8: Delineate and evaluate an argument and specific claims in a text, assessing the validity or fallacy of key statements by examining whether the supporting evidence is relevant and sufficient.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation/ product. Assesses and revises own work with guidance.	III.C2 III.B2	6d 6a

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	9-10R9: Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences.	Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
10th Grade Math

Geometry

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

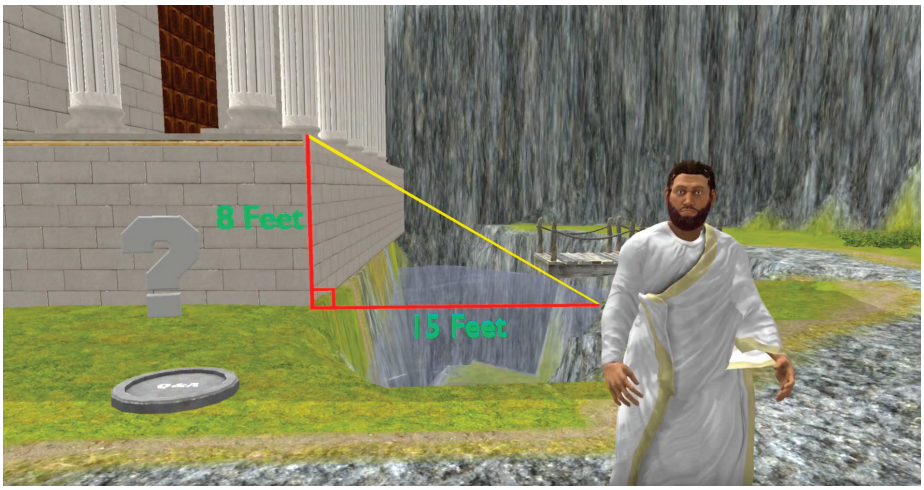
Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into geometry, a world of math. As the adage so eloquently states: "Math may not teach me how to add love or subtract hate, but it gives me every reason to hope that every problem has a solutions." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through shapes, angles, arcs, circles, planes, perpendicular and parallel lines as you develop definitions of rotations, reflections and transformations. As you begin to make sense of problems and persist in solving them, you will be able to construct logical arguments and make use of structure while attending to precision.

In this quest, you create an adventure in 2 dimensional and 3 dimensional of objects while including information explanations of area, circumference and volume formulas.

The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.



The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain why geometry is important and how it affects computers, robotics and video games from 1990-2020.
- Critique the role geometry plays with respect to GPS as it calculates location by three different coordinates within a specific time period.
- Define the role geometry plays in calculating coordinates in order to chart a trajectory for two space vehicle's entry points into a planet's atmosphere and determine three elliptical orbits during a two year time period.
- Determine the strategic role of geometry in the design process of creating a bench cushion for a room within a 2 hour time period (hint: **https://www.youtube.com/watch?v=LZWDKOZYPEw**) .

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire shapes, solve formulas, create viable arguments, critique the reasoning of your peer players or model mathematical formulas. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the foundation of geometry:

Comprehension towards how problem solving procedures work coupled with repeated practice experiences solidifying concrete example enable greater continuity and fluency in geometry principles. Establish definitions as starting points and review algebra as needed. Fluency in geometry ensures that not only are concepts understood, but also promotes exploration time in order to build a foundation towards mastery. Creative learning strategies highly encourage using various tools like graph paper, drawing tools and digital programs or resources.

- Construct points of concurrency of a triangle by including incenter, centroid, circumcenter and orthocenter.
- Compare and contrast two circles with respect to congruence, interior angles and proportions.
- Investigate multi-step proofs and algebraic problems built upon these concepts.
- Distinguish translation displacing points within a plane by the same direction and distance through uss of a vector.
- Describe how 1) a rotation requires identifying the center/point and the measure/direction of the angle of rotation and 2) a line reflection requires a line and also the knowledge of perpendicular bisectors.
- Identify examples of theorems including but not limited to 1) vertical angles being congruent and 2) two parallel lines being cut by a transversal, so that alternate interior angles are congruent.

Know the significance of geometry in art, science and technology throughout the world's history:

Geometry is founded in science, technology and the arts. In ancient times, the Greeks used geometry to connect points and form what is known as constellations. Ancient Mayan culture, in Mexico/Central America, created a cubic style pyramid. Additionally, the Egyptians used geometric shapes (giant stone pyramids), to decorate the Gize plateau. And more recently, a French modern artist used a glass pyramid to landmark the location of the Louvre.

With respect to science, equations are used to calculates mass, volume and surface area of the moon, planets and stars. Geometric shapes are used in determining magnetic flux or electric fields that penetrate different areas. And some orbituals are described as spherical forms in order to be located in an electron cloud.

In technology, geometry has much to do with function, appearance and form. Think Steve Jobs and the beauty of the products he designed. An innovator, a visionary and a maker well ahead of his time, geometry helped to accerate his rise to prominence.

Explain how past practices are current and still used today:

Define how Native Americans were very advanced mathematically and used geometry for the basis of many art forms they created. For example, rug weaving which seems simple to the naked eye, but is an ancient and complex craft that utilizes geometric concepts and designs, as well as visual thinking and creativity. Today, geometry is prevelant in abstract art forms ranging from paintings, sculpture and 2D and 3D images.

Taking it to the next level with critical thinking:

Physical environment has influenced human activities and development throughout history. By the same token, geometry has laid the groundwork for architecture with its concepts on shapes, forms and rules of proportions. As society begins to expand and becomes more complex, people, laws and various new technologies shape history. Examine the relevance of geometry on life as we know it below:

- Determine and describe how intersecting, parallel and perpendictular lines are utilized in everyday life.
- Identify multiple perspectives from of a point that have science or technological implications (hint: magnet, microwave, smartphone button, stylus tip).
- Assess various ways geometry is applied in life as we know it. To fill a fish tank or calculate the number of paint cans required for a room, geometry would be used.
- Investigate issues in goemetry pertaining to bridge building and other major engineering projects.
- Explain how physiotherapy, MRIs, x-rays and ultrasounds utilize geometry to reconstruct organs, tumors, bones,etc. and aid in increasing stability, efficiency and fidelity.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The world of geometry provides a wealth of opportunities to learn about history and to write about people as humans. Geometry is relevant and has been implemented throughout the beginning of time. As a base, geometry can be utilized for text to self, text to text or text to worl connections.

Here are a few ideas:

- Tell players to utilize supporting evidence and various historical moments in how geometry affected, improved economic, political or historical outcomes.
- The history of early geometry has roots going back to 3100 BCE to Mespotamia and Egypt. Create a timeline with mathematical artifacts.
- Examine applications of geometry to the arts, painting, cartography and astronomy and create a learning walk.
- Create a museum gallery walk of key people in the geometry world. Think along the lines of Euclid, Rene Descartes, Girard Desargues, Carl Friedrich Gauss and L.E.J. Brouwer.
- Create a breakout room based on the pandemic. Participants will be required to solve geometry problems in order to escape the room. The solutions to each problem will help to unlock the lock. There can be varying degrees of difficulty as "teamwork makes the dreamwork" and scholar participants can ultimately scaffold one another.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.khanacademy.org/math/geometry/hs-geo-foundations

https://www.nysedregents.org/geometryre/

http://jtseng.weebly.com/uploads/1/2/4/9/12496714/examview_-_geometry_midterm_review.pdf

https://jeopardylabs.com/play/10th-grade-geometry

https://www.analyzemath.com/high_school_math/grade_10/geometry.html

https://www.mathplanet.com/education/geometry

https://www.helpteaching.com/questions/Geometry_and_Measurement/Grade_10

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

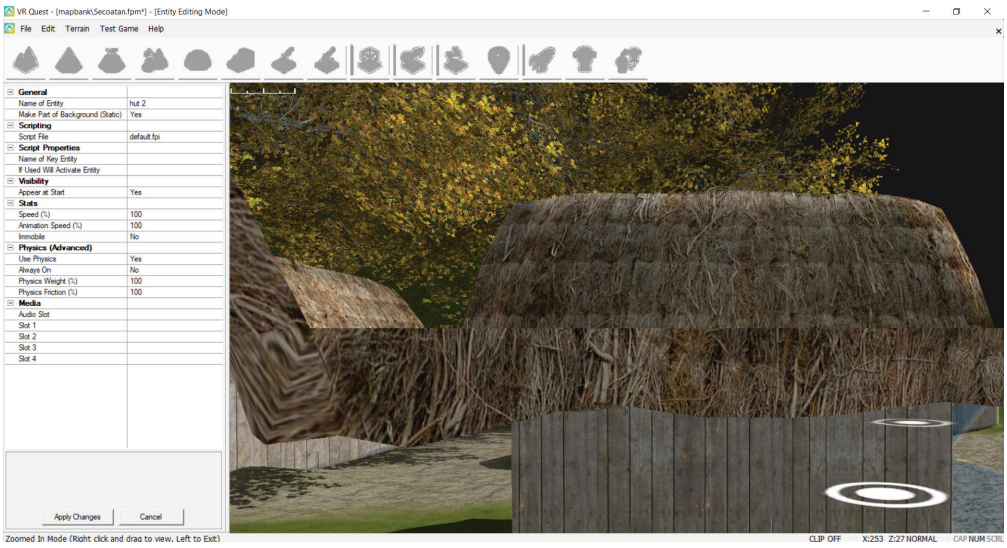
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
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– Were players able to complete the quest in a reasonable amount of time?
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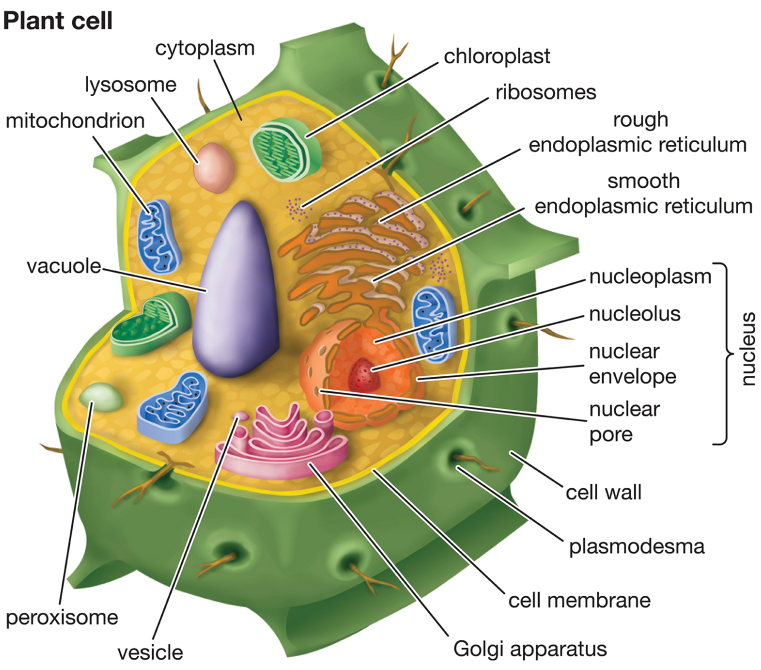
Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	GEO-G.CO.1 Know precise definitions of angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc as these exist within a plane.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	GEO-G.CO.2 Represent transformations as geometric functions that take points in the plane as inputs and give points as outputs. Compare transformations that preserve distance and angle measure to those that do not.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	GEO-G.CO.3 Given a regular or irregular polygon, describe the rotations and reflections (symmetries) that carry the polygon onto itself.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts	GEO-G.CO.4 Develop definitions of rotations, reflections, and translations in terms of points, angles, circles, perpendicular lines, parallel lines, and line segments.		I.B1	5c
Illustrations	GEO-G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. Specify a sequence of transformations that will carry a given figure.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	3c
Informational Texts	GEO-G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent into another.	Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details	GEO-G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative	GEO-G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, SSS, AAS and HL (Hypotenuse Leg)) follow from the definition of congruence in terms of rigid motions.	Uses various note-taking strategies.	IV.D1	6a
Opinion	GEO-G.CO.9 Prove and apply theorems about lines and angles.	Uses common organizational patterns to organize information.		
Organization	GEO-G.CO.10 Prove and apply theorems about triangles.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	II.D2	1b
Point of View		Identifies and evaluates the important features for a good product.	I.B2	1b
Quotations		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.A2	3c
		Restates ideas of others accurately and adds own perspective.	VI.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning	GEO-G.CO.11 Prove and apply theorems about parallelograms.			
	GEO-G.CO.12 Make, justify and apply formal geometric constructions.			
Sequence of Events	GEO-G.CO.13 Make and justify the constructions for inscribing an equilateral triangle, a square and a regular hexagon in a circle.			
	GEO-G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar. Explain using similarity transformations that similar triangles have equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.			
	GEO-G.SRT.4 Prove and apply similarity theorems about triangles.			
	GEO-G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of sine, cosine and tangent ratios for acute angles.			
	GEO-G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.			
	GEO-G.SRT.8 Use sine, cosine, tangent, the Pythagorean Theorem and properties of special right triangles to solve right triangles in applied problems.			
	GEO-G.SRT.9 Justify and apply the formula A= **1 2** ab sin (C) to find the area of any triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	Paraphrases and summarizes information that answers research questions.	III.C2	6d
	GEO-G.C.1 Prove that all circles are similar.			
Audience	GEO-G.C.2a Identify, describe and apply relationships between the angles and their intercepted arcs of a circle.	Uses common organizational patterns to organize information.	III.B2	6a
Organization	GEO-G.C.5 Using proportionality, find one of the following given two others; the central angle, arc length, radius or area of sector.			
	GEO-G.GPE.1a Derive the equation of a circle of given center and radius using the Pythagorean Theorem. Find the center and radius of a circle, given the equation of the circle.	Understands the concept of "audience;" determines audience before creating product.		

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	GEO-G.GPE.1b Graph circles given their equation. GEO-G.GPE.4 On the coordinate plane, algebraically prove geometric theorems and properties. GEO-G.GPE.5 On the coordinate plane: GEO-G.GPE.5a Explore the proof for the relationship between slopes of parallel and perpendicular lines; GEO-G.GPE.5b Determine if lines are parallel, perpendicular, or neither, based on their slopes; and GEO-G.GPE.5c Apply properties of parallel and perpendicular lines to solve geometric problems. GEO-G.GMD.1 Provide informal arguments for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. GEO-G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. GEO-G.GMD.4 Identify the shapes of plane sections of threedimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. GEO-G.MG.1 Use geometric shapes, their measures, and their properties to describe objects. GEO-G.MG.2 Apply concepts of density based on area and volume of geometric figures in modeling situations. GEO-G.MG.3 Apply geometric methods to solve design problems.	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation/product. Assesses and revises own work with guidance. Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
10th Grade Science
Biology



Hamilton Buhl®
Never-Ending Learning Innovation

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VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

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Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

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Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

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- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into biology, a world of life and learning about organisms.

As Niels Bohr once said, "An expert is a person who has made all the mistakes that can be made in a very narrow field."

Science is all about exploring and experimenting in order to learn more.

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel the minds of great scientists as you make hypothesis, gain knowledge and come to your own conclusions. Through biology you will gain insight by recognizing and analyzing different forms of life to make meaning of evolution and the wonder of organisms. As you begin to develop questions, you will be able to explain how key terms are related to each other.

In this quest, you create an adventure in the wonderful environment of a tropical rainforest. The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Analyze how structural and physiological adaptations of organisms relate to natural selection during the 1913 Spanish Flu pandemic for a 12 month period.
- Determine the effects of different types of natural selection on gene pools during World War II time period.
- Summarize the role of natural selection in convergent and divergent evolution from 2019-2020.
- Compare and contrast a phylogenetic tree to another organism during a 30 years time cycle.
- Construct a cladogram based on DNA evidence and any change that occurs within five years.
- Describe the differences in distinguishing characteristics for the six kingdoms for a three year period.
- Compare and contrast examples of representative organisms from the Archaebacteria, Eubacteria, Protista, Plantae, and Animalia Kingdoms within a 10 year time frame.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire organisms using a dichotomous key. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the Geography of the Rainforest:

Discuss geographical features of a rainforest with respect to climate, precipitation, vegetation, elevation and terrain. Though many will think of rainforests and consider them lush and plentiful, rainforests have many diverse physical features. Additionally, there are a variety of species that inhabit the rainforest and peacefully coexist with one another maintaining a strong sense of balance.

Typically, rainforests have several indigenous groups, who inhabit them. The indigenous people interact with their environment and develop unique cultures that help maintain sustainability as well as contribute to the growth and development of the ecosystem. The geographic features have greatly influenced location. Additionally, the role of environment, climate, natural resources, species variety and organisms during the decline of the world's natural resources, the deterioration of the ozone layer and the increase of natural disasters has propelled the conversation of preserving more natural environments.

- Describe the location of the rainforest in relation to its four key layers (emergent, upper canopy, under-story, and forest floor).
- Define the culture of the indigenous people, their established government, ways of life, customs, beliefs, values and traditions. Determine the similarities and differences of Native Americans to the indigenous people.
- Compare and contrast the Spanish flu of 1918 with the Pandemic of 2020 with specific attention to origin, patterns of outspread and successful containment.
- Distinguish human-made features and human activities from "environments" (natural events or physical features like land, air, and water that are not directly made by humans).
- Assess how the monsoon trough affects physical environments and affects human activities.
- Identify chronological adaptation to the different rainforests within a specific time period.

Know the significance of math, science and technology throughout the beginning of the for indigenous people and their history:

The concept of STEAM has been around centuries before the acronym was coined. In actuality, there is much less deforestation in occupied segments of the rainforest than unoccupied. Indigenous people are keenly knowledgeable about plant life, so that they are able to use herbs as medicine and sustain themselves off of plants for consumption, without worrying about poisonous ones. Often, ancient cultures employed mathematical principles for constructing shelter and as a basis for their hunting skills. They utilized concepts of principles of ratios, symmetry and proportions. Mathematics was a central part of everyday life.

Explain how past practices are current and still used today:

Define the state of the rainforest in the past and compare/contrast to the present with respect to indigenous people. Investigate how indigenous people advanced in science and technology with agriculture and cultivation, a central aspect of daily life. Describe their ability to maintain their culture and needs (food, shelter, clothing, medicines) completely from their natural environment. Determine the depth of knowledge indigenous children have to their surroundings. They usually possess greater knowledge of the rainforest than scientists do. Should governments and outsiders recognize the rights of indigenous people to the rainforest land even though they do not own it? Why or why not? Does mankind have an obligation to protect the indigenous? Why or why not?

Taking it to the next level with critical thinking:

Physical environment has influenced human activities and development throughout history. The rainforest is one of the few natural and protected locations in the world that has been uninterrupted by technology, commerce, building infrastructure or any other modern trappings of society as we know it. As society begins to expand and becomes more complex, people, laws and various new technologies shape history. Considering the rational for continuing to preserve the rainforest, examine some of the topics below:

- Determine and describe the relationship between the ozone layer and the rainforest.
- Define biodiversity from an historical and mathematical perspective.
- Assess different types of life within the rainforest as you reflect on the responsibilities and rights of citizens for bringing environmental awareness, sustainability and change for all communities.

- Investigate issues pertaining to bio-piracy and smuggling. Compare and contrast that to deforestation. Which is the bigger threat and why?
- Explain the relationship between the ecosystem and human interaction. How can average individuals facilitate change and influence people's rights and knowledge?. When is social action required? Offer possible solutions to both past and current situations.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The rainforest provides a wealth of opportunities and challenges to design a quest where players discover more about human nature and character, the economy and interests for the public good as they face and overcome obstacles and problem solve. Here are a few ideas:

- Explain the maintenance of biodiversity in the rainforest under human modification. What is the relevance/importance of biodiversity our ecosystem? What role does afforestation play in reducing greenhouse gas emissions? How can social and institutional measures be used to protect the rainforest from devastation? Should society play a role in protecting indigenous people from disease and death?
- Geographic features influence location. Illustrate the role of climate, vegetation, topography, environment, natural resources and animals in the development of the rainforest.
- Create a museum gallery walk of various plants and animal life forms within the rainforest.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.darwins-theory-of-evolution.com/

https://www.khanacademy.org/science/ap-biology/ecology-ap/biodiversity/v/exploring-ecosystems-tropical-rainforest-diversity-california-academy-of-sciences

https://www.youtube.com/watch?v=URUJD5NEXC8

https://www.armoredpenguin.com/wordmatch/Data/2013.09/1022/10220315.199.html

https://www.livescience.com/474-controversy-evolution-works.html

https://www.khanacademy.org/science/biology

https://www.khanacademy.org/science/biology/ecology

https://kidskonnect.com/science/rainforest/

https://www.youtube.com/watch?v=kAy-03hIfck

https://www.britannica.com/science/photosynthesis

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Biology Word Wall

Biology	Organism	Cell
Multicellular Organism	Specialized	Unicellular Organism
Homeostasis	Metabolism	Heterotrophs
Autotrophs	Responsiveness	Reproduction
Heredity	Asexual Reproduction	Sexual Reproduction
Growth	Development	Taxonomy

Scientific Method

Observation	Direct Observation	Indirect Observation
Hypothesis	Qualitative Data	Quantitative Data
Experiment	Control Group	Independent Variable
Dependent Variable	Belief	Fact
Theory	Principle/Law	

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

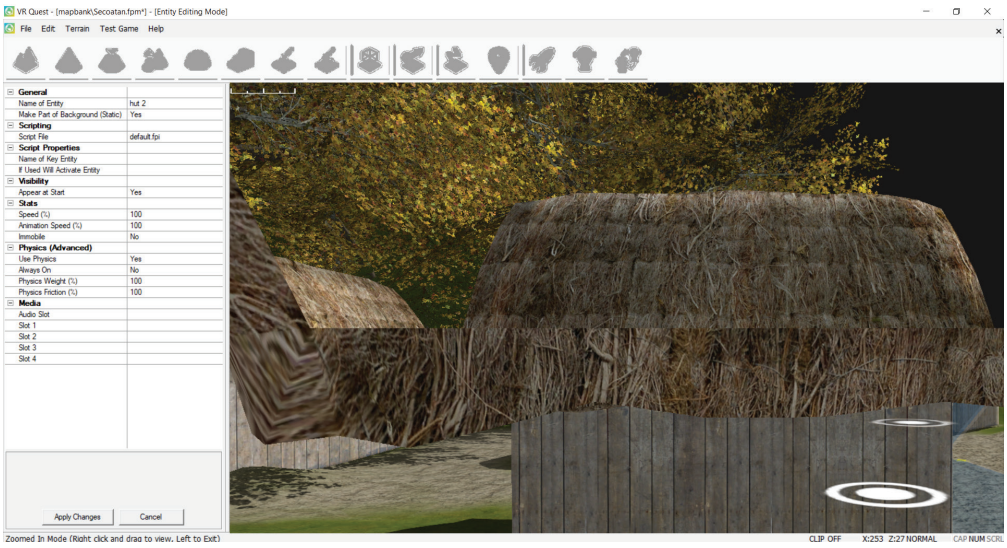
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

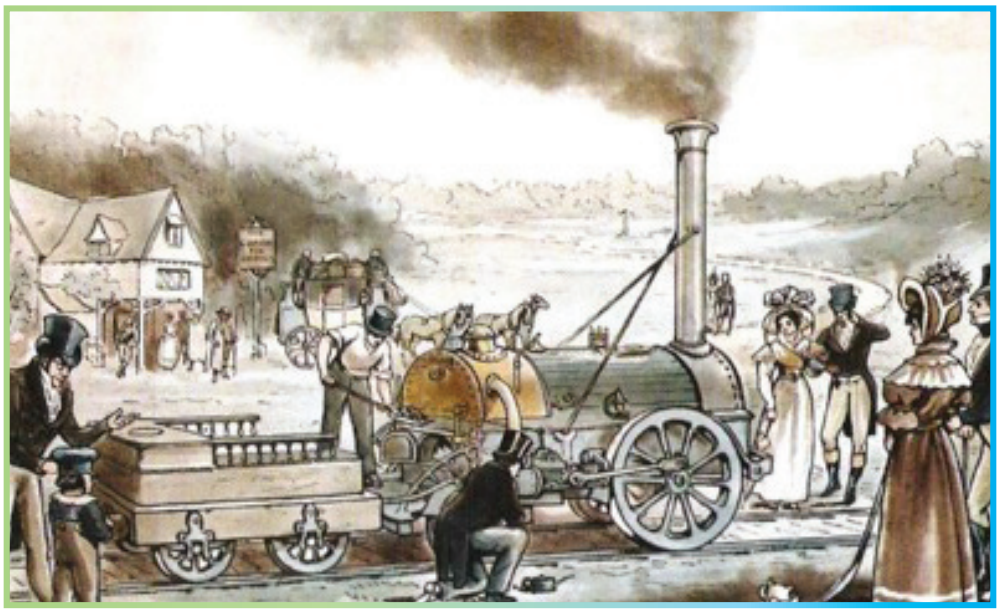
DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Uses pre-selected Web resources to locate information.	IV.C1	3c
Informational Texts	HS-LS2-1. Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales.	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	V.A1	2b
Key Details		Uses various note-taking strategies.	III.B1	3d
Narrative	HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	Uses common organizational patterns to organize information.	IV.D1	6a
		Uses pre-writing to brainstorm ideas for most effective way to present conclusions.		
Opinion	HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	Identifies and evaluates the important features for a good product.	II.D2	1b
Organization		Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.B2	1b
Point of View		Restates ideas of others accurately and adds own perspective.	I.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Quotations **Reasoning** **Sequence of Events**	HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information.	VI.A2 III.C2	3c 6d
Audience **Organization**		Understands the concept of "audience;" determines audience before creating product.	III.B2	6a

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Purpose	HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. HS-LS1-4. Use a model to illustrate cellular division (mitosis) and differentiation. HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, (3) mutations caused by environmental factors and/or (4) genetic engineering. HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. HS-LS1-8. Use models to illustrate how human reproduction and development maintains continuity of life.	Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
10th Grade Social Studies

The Industrial Revolution and The Age of Innovation



Never-Ending Learning Innovation

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Social Emotional Learning is prompted as scholars reflect on the positive and negative effects of the industrial revolution and the age of innovation. Although the industrial revolution had a profound effect on many nations, there were also many negative elements in the form of poor working conditions, poor living conditions, low wages, child labor and pollution. Laissez-faire capitalism, one of the primary causes of the Industrial Revolution, created a climate in which wealthy factory and mine owners were able to exploit working-class workers. How do the impacts of the Industrial Revolution still influence our lives today?

Additionally, the VR Quest STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

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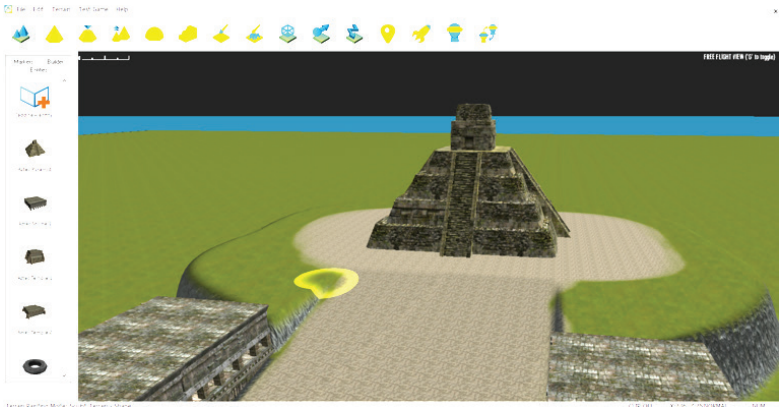
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.



The VR Quest Level Design Screen

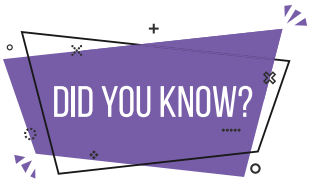
The Journey Begins

Using the latest technology, Virtual Reality now places you in control of your journey into the past. VR Quest® software utilizes simple yet powerful tools to re-create scenes from history. Example levels are provided to demonstrate the capability of the software to place the user into a simulated environment designed around an event or locale. The experience is complete with detailed stereographic 3D buildings, objects and characters surrounding the user as they are placed inside a new world to explore. Sounds, images, videos and special effects all add to the suspension of disbelief providing a nearly tangible reality. The idea of "You are there" is reinforced as the user reacts to the simulation much as they would in the real world by naturally looking around and moving effortlessly to explore new locations or examine in detail specific areas of interest.

Origins of the Industrial Revolution

The term Industrial Revolution is used to describe an extraordinary quickening in the rate of growth and change in society dominated by industry and machine manufacturing.

The Industrial Revolution is divided into two approximately consecutive parts. What is called the first Industrial Revolution lasted from the mid-18th century (1750) to about 1830 and was mostly confined to Britain. The second Industrial Revolution lasted from the mid-19th century (1850) until the early 20th century (1914) and took placed in Britain, continental Europe, North America and Japan.



The term Industrial Revolution was first popularized by the English economic historian Arnold Toynbee (1852–83) to describe Britain's economic development from 1760 to 1840.

The First Industrial Revolution (1750-1830)

The First Industrial Revolution began in Great Britain and gave rise to textiles manufacturing, railroads, steam powered ships, iron and coal. This transition included going from hand production methods to machines and the rise of mechanized factory system. The First Industrial Revolution gave an unprecedented rise in the rate of population growth and overcrowded cities.

In this sub-quest you create an adventure that navigates through Great Britain's transformation from an agricultural society to an industrial, commercial nation. What were the factors that caused this transformation giving rise to the Industrial Revolution? What technologies were invented during this period?

Take an exciting tour of a textile manufacturing factory displaying state of art steam engines mechanizing the production process. Board a locomotive or a steam ship on route to delivering passengers and goods to greater distances than were possible with horse and carriage. Experience the rise of urban living with overcrowded cities and pollution. How did the exploitation and poor living conditions of factory workers lead to social reform?

The Second Industrial Revolution (1850-1914)

The Second Industrial Revolution focused on steel production, the automobile, gas, oil and advances in electricity, communications and manufacturing. Urbanization and standard of living increased on a greater scale and American inventors and inventions made a significant impact in methods of production.

In this sub-quest you create an adventure that navigates through the laboratories and workspaces of noted inventors of the era. Travel with Thomas Alva Edison, Alexander Graham Bell, Nikola Tesla and Henry Ford.

Develop the experience that led to their famous inventions.

What inspired Edison to create the lightbulb and what ideal filament did he finally use to create a continuous light? Why did Alexander Graham Bell call his invention the telephone and what were the first words ever spoken over the telephone? How and why did Nikola Tesla invent the first Alternating Current Electrical System (AC) and induction motor? How did Henry Ford's development of the assembly line mode of production revolutionize the automobile industry?

Edison's Laboratory

There were so many factors and events that contributed to the growth of technology that you should have many available ideas to choose from for your quest. For our example quest, we chose Thomas Edison's Laboratory.

This lab was originally located in New Jersey. Later Edison moved to several other locations but this one holds the special place in history as this is where Edison invented the lightbulb, phonograph and Kinetoscope. Later the laboratory was threatened to be demolished when Henry Ford (the automobile magnate) relocated the building to Greenfield Park in Detroit where you can still visit it today.

In our reconstruction of the lab, we'll use some reference photos and find objects in our inventory that could be used; mostly bottles, tables and chairs.

While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Investigate the factors that first produced Britain's Agricultural Revolution thus paving the way for the Industrial Revolution.
- Explain who Adam Smith was and why his book "The Wealth of Nations" was so influential.
- List some of the major inventions and innovations of the Industrial Revolution and explain how each contributed to change in lifestyles and economic expansion.
- Analyze the incentives that caused the migration of populations of Europe and United States from rural to urban areas.
- Investigate the social and political changes brought by the Industrial Revolution including the creation of a middle class.
- Explain how banking developed to increase the need for credit and capital to fuel industrial growth.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk. Regardless of which one you select an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Know the key factors that contributed to the start of the Industrial Revolution in Great Britain

Five factors contributed to the start of the Industrial Revolution:

1. Agricultural Practices: New farming techniques and improved livestock breeding led to Amplified food production.
2. Abundance of Food: By increasing food production, the British population could be fed at lower prices with less effort than ever before. This allowed a spike in population and increased health.
3. A Ready Supply of Money: Britain had financial institutions, such as a central bank, to finance new factories.
4. Natural Resources were Plentiful: Britain had a vast supply of mineral resources used to run industrial machines, such as coal.
5. A Supply of Markets to Exchange Goods: Great Britain's colonial empire created a ready supply of consumers to purchase its manufactured goods. Its merchant marine could transport these goods to foreign market.

Know the significance of technological and innovative changes that contributed to the first and second industrial revolution:

1. **Power Technologies:** The early part of the Industrial Revolution used natural power sources like water and wind. Later, new power technologies such as steam power and electricity played a major role in the growth of industries. Electric lights allowed factories to stay open longer and produce more goods.
2. **Textile Technology:** The Spinning Jenny, the Cotton Gin and the Sewing Machine were some of the innovations that spurred the growth of the textile industry.
3. **Communications:** The ability to communicate across long distances improved dramatically during the Industrial Revolution. The Electric Telegraph followed by the Telephone changed the way people communicated forever.
4. **Transportation:** The Industrial Revolution brought about the need for improved transportation for shipping large amounts of goods from factories to stores throughout a country. The steamboat and the steam locomotive were modes of transportation that could carry goods and passengers over long distances efficiently.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The Industrial Revolution and Age of Innovation gives you a wealth of opportunities and challenges to design a quest where players discover more about this time period in Global History as they employ critical thinking and problem solving.

Here are a few ideas:

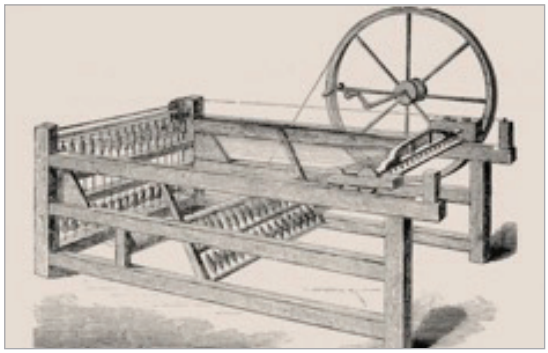
- Challenge players to create a detailed museum walk of the cultural, social, science and technology artifacts that is narrated by prominent figures of that era.
- Create a time lapse displaying how the industrial revolution gradually changed the way people lived and how economies expanded.
- Immerse the user in a typical factory of the industrial revolution time period and experience the conditions of a worker.

Word Wall

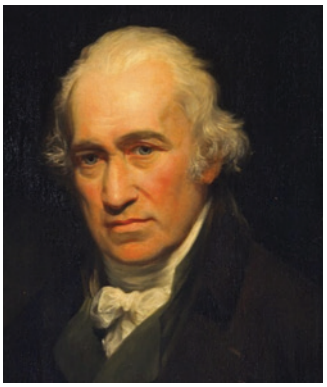
Apply major terms and vocabulary in your quest. Examples of vocabulary that can be applied to your storyboard.

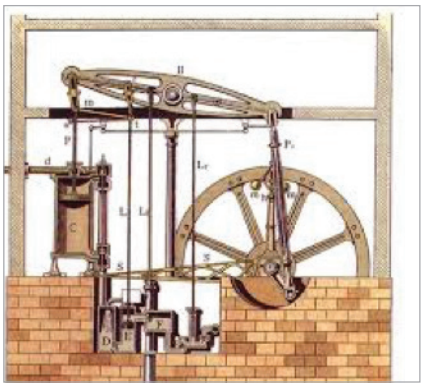
- Agriculture
- Capitalism
- Assembly Line
- Automation
- Collective Bargaining
- Competition
- Demand
- Entrepreneur
- Factory
- Industrialization
- Invention
- Mass Production
- Laissez-faire
- Locomotive
- Means of Production
- Mechanization
- Middle Class
- Migration
- Modernization
- Monopoly
- Natural Resources
- Production
- Profit
- Railroad
- Rural
- Spinning Jenny
- Standard of Living
- Steam Engine
- Stock
- Stock Exchange
- Supply
- Telegraph
- Tenement
- Textile
- Textile Mill
- Unions
- Urbanization
- Working Class

Major Inventors from the Industrial Revolution and Samples of their Innovations

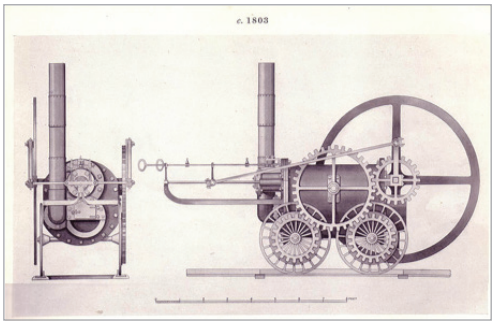


James Hargreaves: The Spinning Jenny – Timeframe: 1764

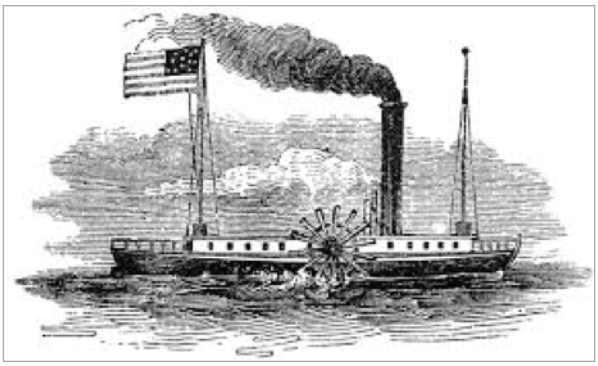




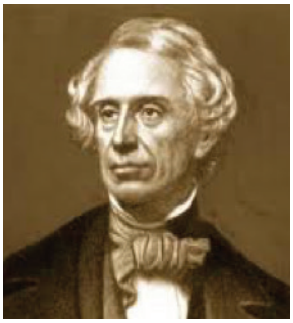
James Watt: Enhanced Steam Engine – Timeframe: 1765-1781

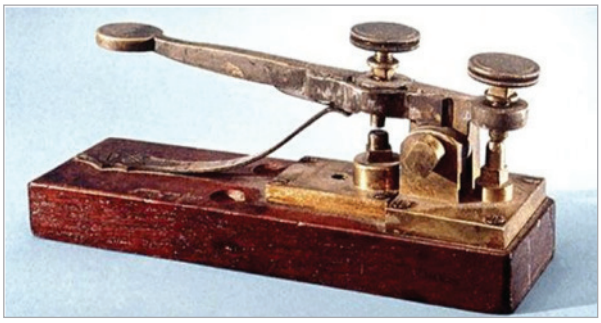


Richard Trevithick: Steam Locomotive – Timeframe: 1803

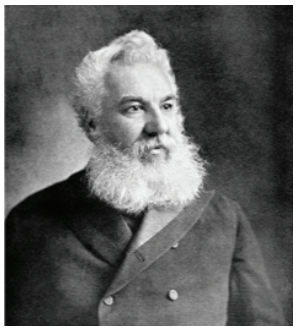


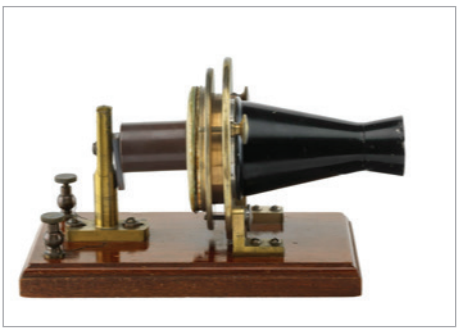
Robert Fulton: Commercial Steamboat – Timeframe: 1807



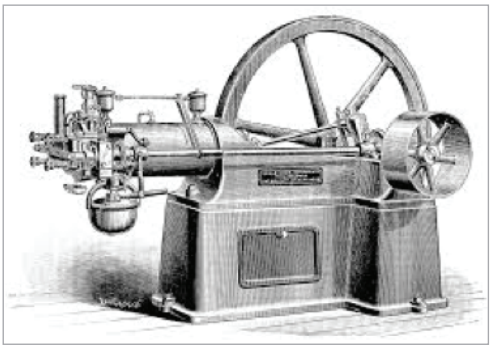


Samuel F.B. Morse: The Telegraph – Timeframe: 1837

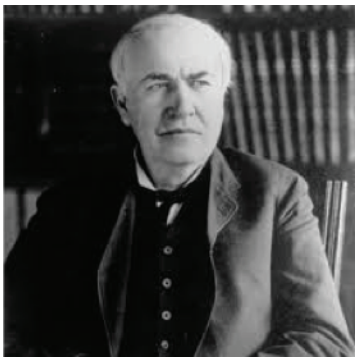
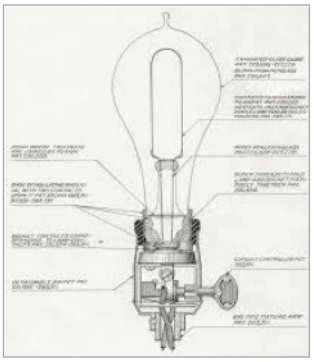




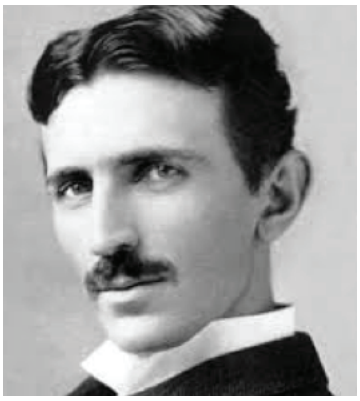
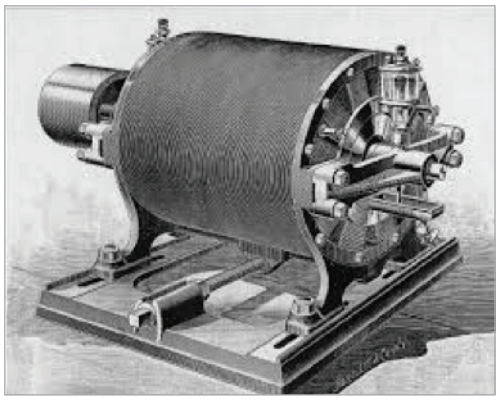
Alexander Graham Bell: The Telephone – Timeframe: 1876

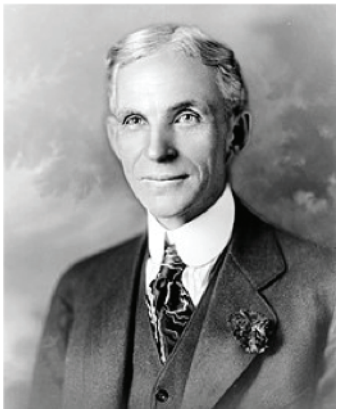
Nikolaus Otto: Four Stroke Gas Powered Engine – Timeframe: 1878

Thomas Alva Edison: Incandescent Lamp – Timeframe: 1878-1879

Nikola Tesla: Induction Electric Motor – Timeframe: 1888



Henry Ford: Moving Assembly Line for Automobiles – Timeframe: 1913

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.history.com/topics/industrial-revolution/industrial-revolution

https://www.historycrunch.com/negatives-of-the-industrial-revolution.html#/

https://www.britannica.com/list/inventors-and-inventions-of-the-industrial-revolution

https://richmondvale.org/en/blog/second-industrial-revolution-the-technological-revolution

https://www.history.com/news/second-industrial-revolution-advances

Student Voice and Empowerment

Educators often feel as if they must know everything before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

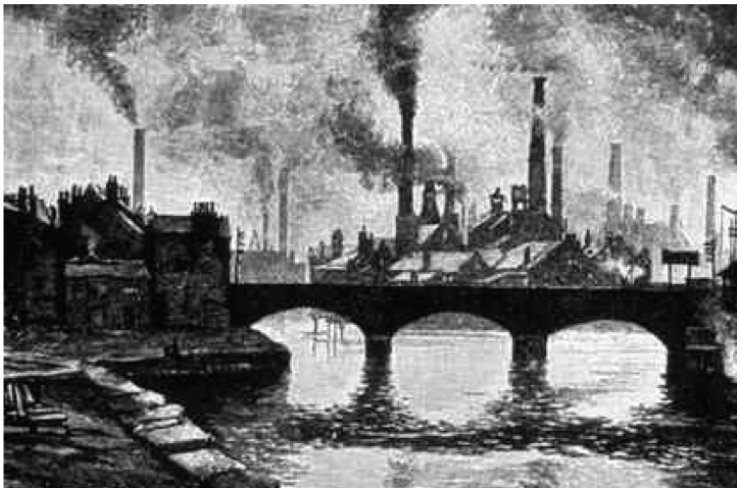
Climax
A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

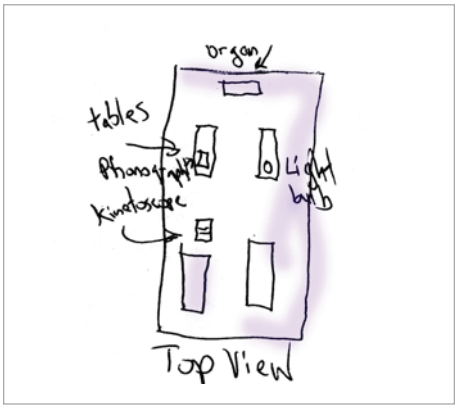
In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for an Industrial Revolution quest called Edison's Laboratory.

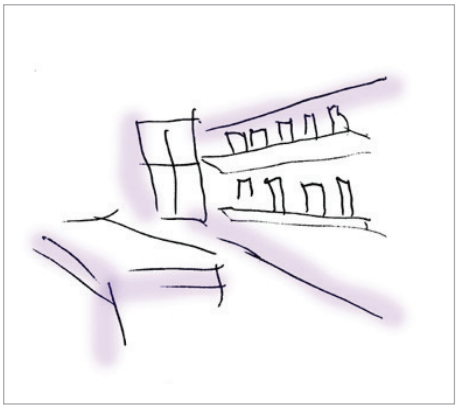
This illustration highlights effects of industrialized cities and towns: Pollution caused by factories.



Sample Storyboard – Edison's Laboratory

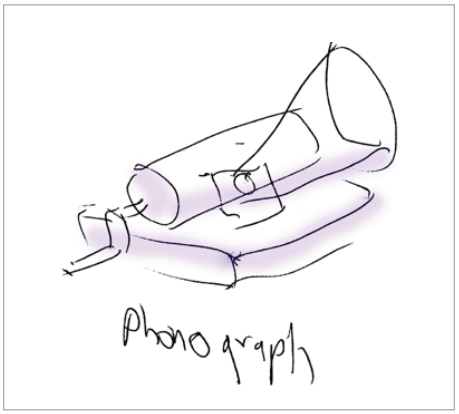


1. Top View of Edison's Laboratory

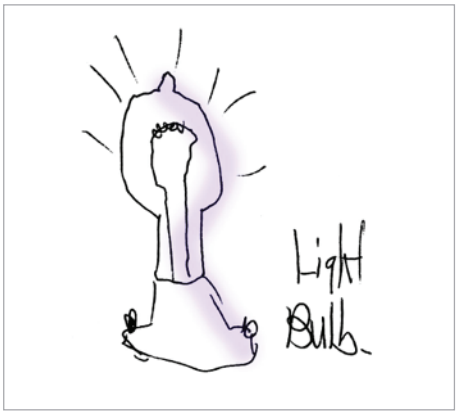


2. Shelves of bottles on walls.

3. Kinetoscope



4. Phonograph



5. Lightbulb

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 – 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

For example, the locomotive, a product of the Industrial Revolution, allowed large-scale movement of resources and people over long distances.

06

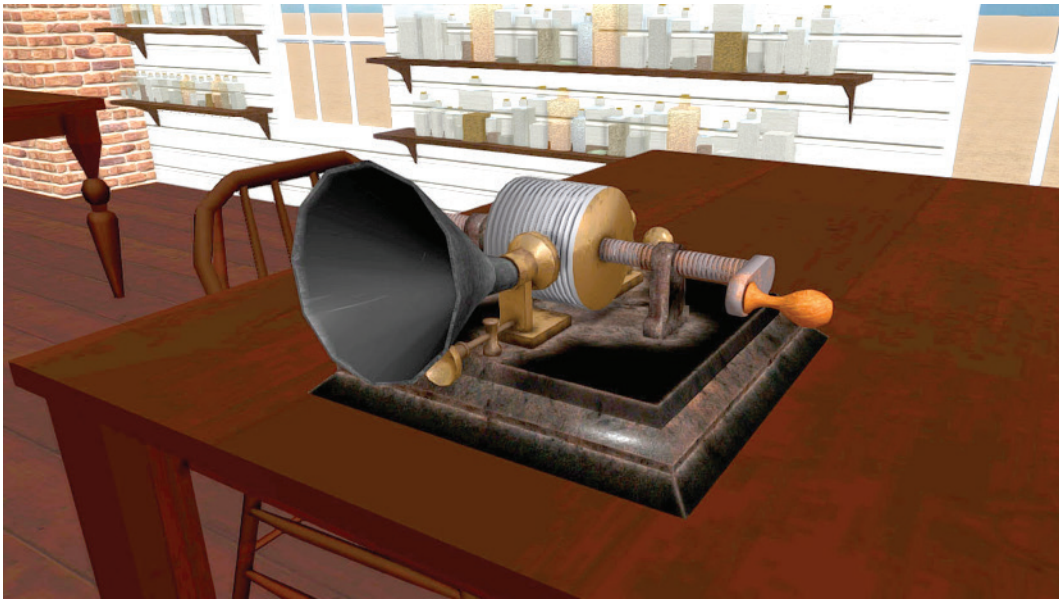
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 – 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Analyzing Classification Connection Cultural Perspective	RL.9-10.11 Interpret, analyze, and evaluate narratives, poetry, and drama, aesthetically and ethically by making connections to: other texts, ideas, cultural perspectives, eras, personal events and situations. a. Self-select text to respond and develop innovative perspectives.	Creates and shares reading experiences and responds in a variety of ways and formats. Reads independently. Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words. Recognizes that own point of view influences the interpretation of information. Recognizes the effect of different perspectives and points of view on information.	1.A1 1.A2 IV.A1 II.A2	6c 4c 6a 3a
Evaluating Interpreting Analyzing	b. Establish and use criteria to classify, select, and evaluate texts to make informed judgments about the quality of the pieces.	Analyzes disparate points of view discovered in different sources. Draws conclusions based on explicit and implied information.	IV.A1 IV.A2 IV.A1	3b 5c 5c
Categorization Comparing Connections	RI.9-10.1. Cite strong and thorough textual evidence to support analysis of the what the text says explicitly as well as inferences drawn from the text.	Identifies and uses a variety of technology tools, including web-based interactive tools, to organize information, create a product, and enhance communication. Seeks balanced view by using diverse sources to access appropriate material.	IV.A2 IV.A1	1a 1b
Evidence Explicit Text Main Idea/ Central Message	RI.9-10.2. Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.	Selects information based on authority and point of view. Compares online resources to seek global perspective Identifies misconceptions and revises ideas as new information is gained.	I.D1 III.B1 IV.B1	3c 6d 3a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Relationships Summarizing Analyzing	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Analyzes disparate points of view discovered in different sources. Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information. Creates and shares reading experiences and responds in a variety of ways and formats.	IV.B4 II.B3 III.B1	4b 5b 4a
Argument Claims Conflicting Viewpoints	RI.9-10.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.	Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words. Recognizes that own point of view influences the interpretation of information.	VI.C1 IV.A2 IV.B4	4a 3d 6d
Evaluating Evidence Persuasion Reasoning Analyzing	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Recognizes the effect of different perspectives and points of view on information. Analyzes disparate points of view discovered in different sources. Draws conclusions based on explicit and implied information	VI.C1 V.A3 III.C2 IV.A3	6b 3a 1c 3b
Categorization Comparing Connections Evidence Explicit Text	RI.9-10.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information.	V.A2 IV.D1 II.D1	4d 3a 6a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Main Idea/ Central Message Relationships Summarizing	RI.9-10.2. Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.	Analyzes disparate points of view discovered in different sources.	IV.D1 II.D1 II.D2 VI.D1	3a 6a 6d 2c
Analyzing Argument Claims	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Identifies and uses a variety of technology tools, including Web-based interactive tools, to organize information, create a product, and enhance communication. Seeks balanced view by using diverse sources to access appropriate material	V.A1 IV.A1 IV.A1	7a 6d 6b
Conflicting Viewpoints Evaluating Evidence	RI.9-10.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.	Selects information based on authority and point of view. Compares online resources to seek global perspective Identifies misconceptions and revises ideas as new information is gained. Analyzes disparate points of view discovered in different sources.	IV.A2 I.D3 IV.D1	4c 1b 1b
Persuasion Reasoning	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Recognizes the effect of different perspectives and points of view on information. Recognizes that own point of view influences the interpretation of information.	VI.C3	3a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Audience	W.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	Creates products for authentic reasons and audiences. Uses two or three strategies to revise product based on self-assessment, teacher feedback, and peer feedback. Identifies and uses a variety of technology tools, including Web-based interactive tools, to organize information, create a product, and enhance communication.	V.B2	5c
Organization	W.9-10.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	Experiments with various types of multimedia software and online applications for artistic and personal expression. Works collaboratively to develop, publish, and present projects involving 1-2 media that effectively communicate information and ideas about the curriculum to authentic audiences.	VI.C1	5b
Purpose	W.9-10.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	Gathers and uses information ethically by citing all sources. Credits sources by using correct bibliographic format.	IV.D3	5c
Analyzing	RI.9-10.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	Revises the question or problem as needed to arrive at a manageable topic for inquiry. Expresses the big idea and the relation of own topics of interest to that idea through a mind map using pictures and words. Plans inquiry to test hypothesis or validate thesis.	VI.A2	1c

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Argument	W.9-10.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	Compares information found to tentative thesis or hypothesis; revisits and revises thesis/hypothesis as appropriate. Refines questions to guide the search for different types of information. Uses different formats as sources of information.	VI.B2	1b
Character Types Claims Evaluating Evidence	W.9-10.9. Draw evidence from literary or informational texts to support analysis, reflection, and research a. Apply grades 9–10 reading standards to literature (e.g., "Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]").	Seeks balanced view by using diverse sources to access appropriate material. Selects information based on authority and point of view. Compares online resources to seek global perspective. Analyzes disparate points of view discovered in different sources. Draws conclusions based on explicit and implied information.	IV.B2 I.A2 I.B1	2c 6d 2c
Informational Text Quotation Patterns Reasoning Theme	b. Apply grades 9–10 reading standards to literary nonfiction (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning").	Gathers and uses information ethically by citing all sources. Credits sources by using correct bibliographic format	I.B3 IV.A3	1a 3b

VR Quest® STEAM Curriculum Guide
11th Grade English

The Red Convertible

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with the fictional story, "The Red Convertible". As the adage so eloquently states: "reading opens the door to unlimited knowledge." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of the aftermath of the Vietnam War, as you gain insight into mental health, family relationships and symbolism as make meaning of life. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an edventure in literacy and social and emotional learning for a gallery walk. The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of the Vietnam War in a 10 minute time period
- Determine the representation of the convertible over a five month time span
- Create a time line of Henry's emotional stages over a five year period
- Compare and contrast the two brothers' dispositions over a year time span

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the side effects of war to our psychological well being:

While war has always been the answer to make other countries adhere to what the U.S. wants and believes, it has demonstrated that it carries severe and detrimental impact on those that were part of the military. The Vietnam War not only claimed the lives of countless soldiers, it also affected military survivors and their loved ones.

- How did chemical warfare affect American veterans of the Vietnam War?
- How were they helped or hindered by Agent Orange?
- Compare and contrast America's military approach to the Vietnam War and to today's military actions in other countries.
- Determine everyday implications for civilians from the war.
- Define the term boat people and explain how they came about.

Know the significance of art, science and technology throughout American history:

Art is widely used to capture emotions, release stress and highlight important events of our time. As the Vietnam War pitted many Americans against each other with arguing whether or not Americans should have been there, it also became a time period of some of the most provocative and visionary artists who used art as a form of protest. Particularly, many marginalized voices or artists of diverse backgrounds rose to prominence. The U.S. uniquely utilized advanced technology in new ways, like sensors, to gain a military advantage. Science was very prevalent during the Vietnam War as chemical warfare was widely used and would have side effects for years to come.

Explain how past practices are current and still used today:

Define how past leadership and military might are different from today. How has the U.S. changed in its interactions with other countries? What or who is responsible for those changes? Why do you think the author utilized Native American characters? Is the literature specific to an ethnic population or does it have universal appeal? Why or why not?

Taking it to the next level with critical thinking:

Conflict and discourse has influenced human interactions and activities from the beginning of history. As people become more globally concerned with the human rights, natural resources and sustainability, concerned politicians and citizens often define or indicate how they think others should live.

- Determine and describe the two brothers' outlook and dispositions.
- Identify cause and effect of participating in war to psychological health and wellness and a return to normalcy in society.
- Assess the relevance of data collected pertaining to the Vietnam War and establish how it improves the conduct of conflict.
- Compare and contrasts the civil liberty protests in Hong Kong with the Black Lives Matter protests in the U.S..

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of war and its outcomes when soldiers come home, with respect to our economy and growth as a nation, provides a wealth of opportunities and challenges to design a quest where players discover better understand government, politics and why decisions are made. Take time and reflect on the obstacles and problems, soldiers encountered. War isn't always about war, but often politicians or people of importance have hidden agendas. Here are a few ideas:

- Tell players to utilize various timelines, globes, maps and documents to illustrate other wars the U.S. has fought and the reason why. What affect did these wars have immediately on the economy, the American pockets and the social and emotional health and well being of its participants?
- Create a museum gallery walk of historical points of the Vietnam War. Detail all the leaders involved, key concepts, events and symbolism.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.bartleby.com/essay/The-Red-Convertible-Short-Story-Analysis-FKA3XPCTJ

https://www.bartleby.com/essay/Character-Analysis-Of-The-Red-Convertible-By-FKHYEUJUMAR

https://www.studymode.com/essays/Character-Analysis-Of-The-Red-Convertible-45598819.html

https://www.youtube.com/watch?v=CN5w-i7voBs

https://www.youtube.com/watch?v=0YCwEPvDMsE

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2

1.

2.

Body Panels 3-10

3.

4. P

5.

6.

7.

8.

9.

10.

Climax

11.

Summary

12.

Metacognitive Accountable Talk Extension Stems

Based on the evidence…

The key information indicates/identifies/explains...

This reminds me of…

This is relevant because…

In summary, this means...

To expand/piggyback off of what _____ said...

I infer this represents…

I used to think _____, but now _____

What's important here is...

It's interesting that...

One thing we should notice is...

One thing we haven't considered is...

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

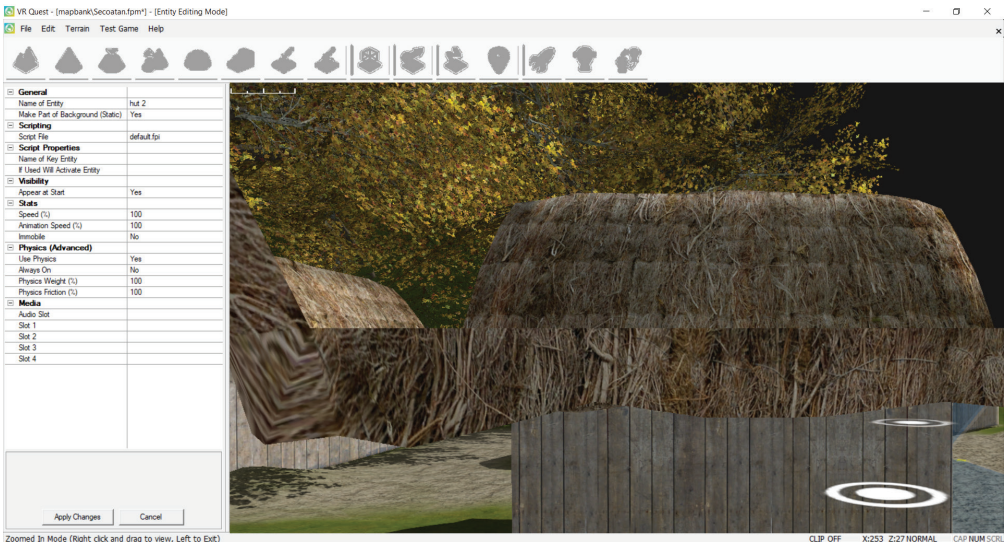
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

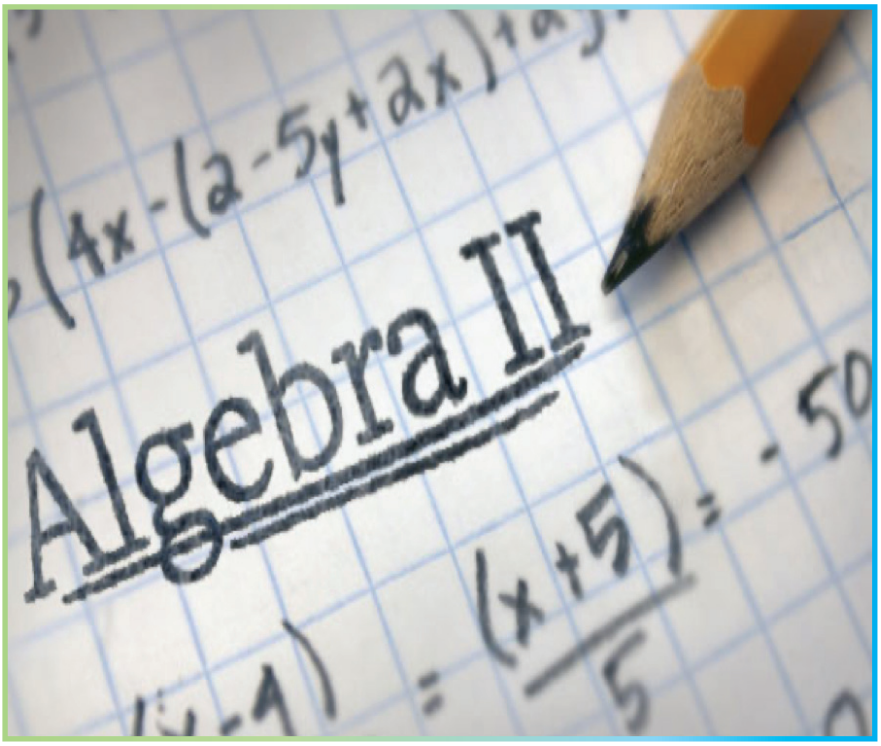
In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	11-12R1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly/implicitly and make logical inferences, including determining where the text is ambiguous; develop questions for deeper understanding and for further exploration.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	11-12R2: Determine two or more themes or central ideas in a text and analyze their development, including how they emerge and are shaped and refined by specific details; objectively and accurately summarize a complex text.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts			I.B1	5c
Illustrations		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	3c
Informational Texts	11-12R3: In literary texts, analyze the impact of author's choices. In informational texts, analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop.	Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative		Uses various note-taking strategies.	IV.D1	6a
Opinion	11-12R4: Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings.	Uses common organizational patterns to organize information.	II.D2	1b
Organization		Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	I.B2	1b
Point of View	Analyze the impact of specific word choices on meaning, tone, and mood, including words with multiple meanings.	Identifies and evaluates the important features for a good product.	I.A2	3c
Quotations	Analyze how an author uses and refines the meaning of technical or key term(s) over the course of a text.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.	VI.A2	

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events**	11-12R5: In literary texts, analyze how varied aspects of structure create meaning and affect the reader. In informational texts, analyze the impact and evaluate the effect structure has on exposition or argument in terms of clarity, persuasive/rhetorical technique, and audience appeal. 11-12R6: Analyze how authors employ point of view, perspective, and purpose, to shape explicit and implicit messages (e.g., persuasiveness, aesthetic quality, satire, sarcasm, irony, or understatement). 11-12R7: In literary texts, analyze multiple adaptations of a source text as presented in different formats (e.g., works of art, graphic novels, music, film, etc.), specifically evaluating how each version interprets the source. In informational texts, integrate and evaluate sources on the same topic or argument in order to address a question, or solve a problem. 11-12R8: Delineate and evaluate an argument in applicable texts, applying a lens (e.g. constitutional principles, logical fallacy, legal reasoning, belief systems, codes of ethics, philosophies, etc.) to assess the validity or fallacy of key arguments, determining whether the supporting evidence is relevant and sufficient. 11-12R9: Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.		
Audience	Identifies and evaluates the important features for a good product.	III.C2	6d
Organization	Understands the basic concept of plagiarism as copying the work of others.	III.B2	6a
Purpose	Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
11th Grade Math
Algebra II



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Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

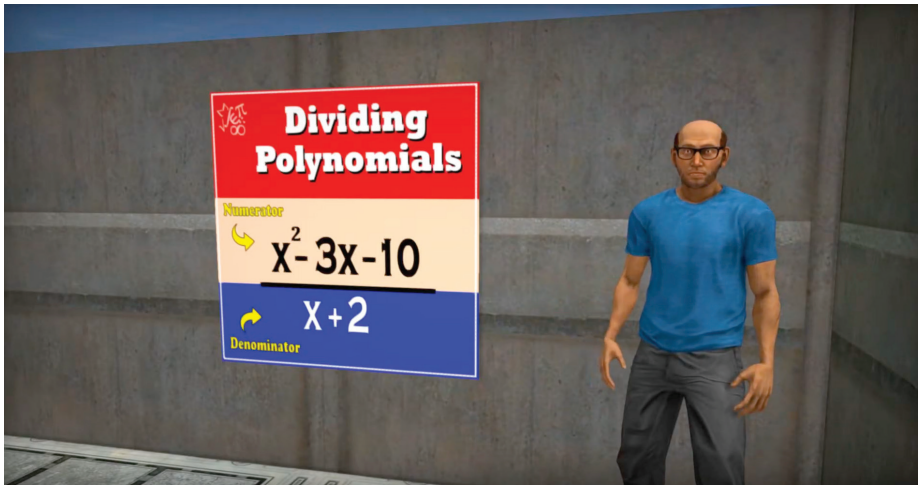
Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into Algebra, a world of math. As the adage so eloquently states: "An ounce of Algebra is worth a ton of verbal argument." As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of Algebra as you gain insight into linear equations, variables and quadratics) to make meaning of life and its lessons. As you begin to develop questions about this topic, its history, its relationship to the greatest thinkers in the world, and the artistic community, you will be able to explain chronologically how all disciplines are related to each other.

In this quest, you create an Algebraic adventure such as a learning walk depicted in the Algebra template in the software. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order.

While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.



The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain budgeting for a real-life scenario linear equation like a gym membership at a flat rate and over a two-year period.
- Determine how a quadratic equation can find the minimum or maximum possible value for a specific historical celebratory event over a two month period (hint: think like an event planner).
- Create an exponential equation to represent a housing loan situation reflecting current interest rates over a 20 and 30 year time period.
- Compare and contrast two linear equations of a real life scenario like two different mobile phone plans over a one year period (note: the variable might be cost per text messages and the number of texts each month).

Consider new sneakers cost $159, t-shirts $29.99 and jeans $199 and you purchase three pairs, six shirts and four jeans then at the register you will be charged 3(159) + 6(29.99) + 4(199) plus tax. That polynominal expression would be represented as such 3S +6T +4J.

If you drive an Uber and need to make $100 and the base rate is $1.50 a mile and you receive half of that, the polynominal expression is 1/2 ($1.50)x. Assuming the polynominal is $100, when you solve for x it would be 133.33 miles.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03

Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of Algebra in our economy:

Recovering from the pandemic means rebuilding the economy. It is very important that everyone do their best to support small and local businesses. At the same time, many people might have limited funds because of lost jobs and less employment opportunities. The new normal economy will have many diverse deals. You might have two competing firms offer the same item at a discounted rate. The reductions from each place are different. For instance, if you buy 360 of the items from firm A, you get a $4 reduction off each item. For the same total price, Firm B gives you 320 of the same item but with a discount of $3 per item. Possessing a solid Algebraic foundation fosters a transdisciplinary interaction with the economy and helps to contribute to a unique skillset prompting critical thinking and problem solving. These skills will not only make you special by thinking more sharply, but also contribute to your personal growth and development. Additionally, understanding and applying Algebra to your surroundings and everyday life will help you see the world through an entrepreneurial lens.

- How did the location of major mathematicians affect their academic journey and their findings in relation to the theories or algorithms they established?
- Were they helped or hindered and how so by culture, personal beliefs, family and environment?
- Compare and contrast two different mathematicians with one being either a woman or a nonwhite male. What observations and assumptions do you make and why?
- Determine every day implications for Algebra such as the number of people-hours it takes to assemble x engines in a factory (hint: the positive integers would be an appropriate domain for the function).
- Define T(y) as the temperature in the atmosphere as a function of height and h(t) is the height of a weather balloon as a function of time.

Know the significance of art, science and technology throughout the mathematical history:

Since the beginning of history, math and art have been intertwined. Besides portions, symmetry and ratios, art can be seen in Algebra. Dimensions of Algebra are recognized by linear perspectives as well as by more complex and fresh perspectives artistically. Throughout history, scientists employed mathematical skills to test out their hypothesis and analyze their theories.

Algebra has always been a relevant and real life skill employed from the past to present day. Additionally, technology has been a fundamental vehicle for manipulation and representation to facilitate more authentic and meaningful mastery of Algebra. Not only can code be formulated for scaffolding and testing out equations, but Algebra, as a tool for modeling, can exemplify various approaches and provide a firm foundation for symbolic representation.

Explain how past practices are current and still used today:

Define how past theories, algorithms and equations apply in current times. Budgeting, the economy and money are always at the forefront of our modern existence. From simple and routine chores like going grocery shopping or paying bills to figuring out your investments or understanding the stock market are all based on Algebraic dispositions. In the real world, linear equations can be something like how much a taxi ride from the airport costs to figuring out details of a vacation, lifestyle or money needed for a startup.

Taking it to the next level with critical thinking:

Algebra and math has influenced the environment and human activities throughout history. As people become more globally concerned with the ozone layer and sustainable living, determining unknown variables have taken a greater role in how we live. By investigating relationships of various systems, concerned citizens are hypothesizing how to care and maintain the atmosphere, biosphere, hydrosphere and geosphere.

- Determine and describe how two changing variables can alter the end result of an equation using a concrete real world scenario.
- Identify cause and effect in order to analysis humans relationship with their environment.
- Assess data to predict human activities effect on the ozone layer at different references points.
- Explain how to measure, monitor and quantify change in economic and ecological systems, as well as social justice parameters over time.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of Algebra with respect to our environment and growth as a nation provides a wealth of opportunities and challenges to design a quest where players discover better understand how math and the economy and/or academic growth and discoveries occur. Some mathematicians, in all cultures were not fully recognized during their lifetime as discrimination existed and they faced many obstacles in their careers. Take time and reflect on the obstacles and problems they encountered as they worked to produce mathematical computations. Here are a few ideas:

- Tell players to utilize various globes, maps and documents to show the location of major mathematicians. Create a timeline of their lives and accomplishments. What affect did their mathematical discoveries have immediately and in the future?
- Geographic features and political conditions influence thought leaders and developments made in academics. Illustrate the specific turning points in history with respect to major mathematical highlights and discoveries.
- Create a museum gallery walk of contributions, timelines and historical notes of key people in mathematical history like Benjamin Banneker, Srinvasa Ramanujan, Renee Descartes, John Forbes Nash, Jr., Leonardo Pisano Bigollo, Albert Einstein, Archimedes, Thales, Isaac Newton, Blaise Pascal, Euclid, Aryabhata, Ptolemy, Ada Lovelace, Alan Turing, Omar Khayyam, Eratosthenes, John von Neumann, Pierre de Fermat, Gottfried Wilheim Leibniz, John Napier, Sophie Germain, Emmy Noether, Evariste Galois, Edward Witten, Georg Cantor, George Boole, Daniel Bernoulli, Luca Pacioli, Andrew Wiles, David Hilbert.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.khanacademy.org/math/Algebra2

https://www.mathplanet.com/education/Algebra-2

https://www.sophia.org/subjects/Algebra-2

https://www.dummies.com/education/math/Algebra/Algebra-ii-for-dummies-cheat-sheet/

https://www.youtube.com/watch?v=j24flxR7F3k

https://www.youtube.com/watch?v=i7idZfS8t8w

https://www.time4learning.com/homeschool/curriculum/high_school_Algebra2.html

https://www.youtube.com/watch?v=vbPUS-0Wbv4

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Math Vocabulary Word Wall

abscissa
absolute value equation
absolute value inequality
Algebraic expression
Algebraic representation
ambiguous case
antilogarithm asymptote
base of a logarithmic function/of an exponential function
binomial expansion
coefficient
cofunctions
common logarithm
complex fractional expressions
compound interest
constant function
degree of a polynomial
direct variation
discriminant expand a binomial
exponential form
exponential function
extraneous root
fractional exponent
frequency (of a periodic function)
function notation
inverse function
inverse variation
laws of exponents
laws of logarithms
linear equation
linear expression
linear system logarithm
negative exponent
nth root
nth term
One cycle of a trigonometric function
one-to-one function
periodic function
phase shift
polynomial expression
polynomial function
powers of i
quadratic equation
quadratic formula
quadratic inequality
quadratic trinomial radian
radical equation
radical expression
range (of a function)
rational coefficient
rational equation
rational expression
rational inequality
rationalize denominators
recursive definition
restricted domain root of an equation
sigma notation
sum and product of roots
sum of an arithmetic series
system of equations/inequalities
transformation
transformations of functions and relations
vertical line test

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose	Convert
Decompose	Demonstrate	Derive	Describe	Determine	Develop	Differentiate
Distinguish	Evaluate	Expain	Explore	Express	Fluent	Generate
Identify	Interpret	Justify	Know	Make	Prove	Recognize
Reference	Represent	Solve	Specify	State	Understand	Use
Verify	Written Method/ Representation					

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

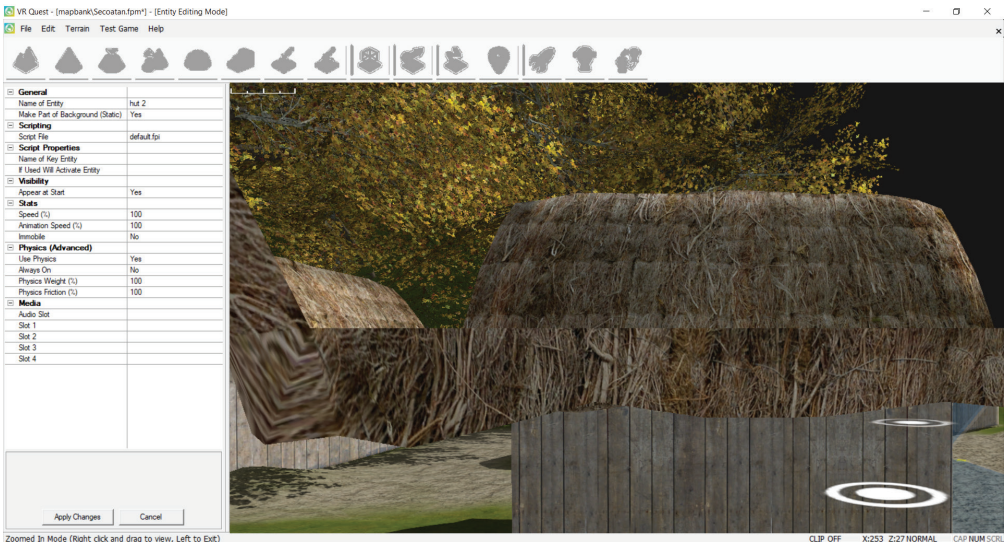
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	AII-N.RN.1 Explore how the meaning of rational exponents follows from extending the properties of integer exponents.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	AII-N.RN.2 Convert between radical expressions and expressions with rational exponents using the properties of exponents.	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts		Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts	AII-N.CN.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi with a and b real.	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	AII-N.CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	Uses pre-selected Web resources to locate information.	IV.C1	3c
Informational Texts		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	V.A1	2b
Key Details	AII-A.SSE.2 Recognize and use the structure of an expression to identify ways to rewrite it.	Uses various note-taking strategies.	III.B1	3d
Narrative	AII-A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	Uses common organizational patterns to organize information.	IV.D1	6a
Opinion		Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	II.D2	1b
Organization	AII-A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines.	Identifies and evaluates the important features for a good product.	I.B2	1b
Point of View	AII-A.SSE.3c Use the properties of exponents to rewrite exponential expressions.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.	I.A2	3c

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Quotations **Reasoning** **Sequence of Events** **Audience** **Organization** **Purpose**	AII-A.APR.2 Apply the Remainder Theorem. AII-A.APR.3 Identify zeros of polynomial functions when suitable factorizations are available. AII-A.APR.6 Rewrite simple rational expressions in different forms. AII-A.CED.1 Create equations and inequalities in one variable to represent a real-world context. AII-A.REI.1b Explain each step when solving rational or radical equations as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. AII-A.REI.2 Solve rational and radical equations in one variable, identify extraneous solutions, and explain how they arise. AII-A.REI.4 Solve quadratic equations in one variable. AII-A.REI.4b Solve quadratic equations by: i) inspection, ii) taking square roots, iii) factoring, iv) completing the square, v) the quadratic formula, and vi) graphing. AII-A.REI.7b Solve a system consisting of a linear equation and a quadratic equation in two variables Algebraically and graphically.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation/product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective. Identifies and evaluates the important features for a good product. Understands the basic concept of plagiarism as copying the work of others. Identifies facts and details that support main ideas.	VI.A2 III.C2 III.B2 VI.C2	3c 6d 6a 7b

VR Quest® STEAM Curriculum Guide
11th Grade Social Studies

Civil Rights

Hamilton Buhl®
Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve – all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

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Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

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- Implement assessment rubrics with information fluency skills to guide the design process.
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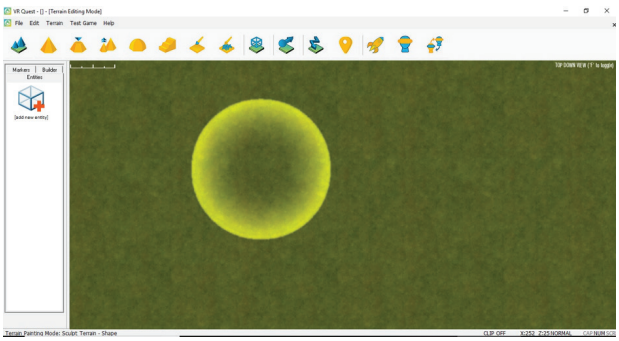


The VR Quest Level Design Screen

The Journey Begins

Using the latest technology, Virtual Reality now places you in control of your journey into the past. VR Quest software utilizes simple yet powerful tools to re-create scenes from history. Example levels are provided to demonstrate the capability of the software to place the user into a simulated environment designed around an event or locale. The experience is complete with detailed stereographic 3D buildings, objects and characters surrounding the user as they are placed inside a new world to explore. Sounds, images, videos and special effects all add to the suspension of disbelief providing a nearly tangible reality. The idea of "You are there" is reinforced as the user reacts to the simulation much as they would in the real world by naturally looking around and moving effortlessly to explore new locations or examine in detail specific areas of interest.

Prepare to travel back in time to learn more about American history and a period of unequal rights. As you create the game, consider if there is one America or many. Setting the stage, various factors contributed to the rise of the United States as a global power. As it was expanding overseas, other countries were concerned about the United States' international grow and its participation in World War I. The prior political climate and current state of the economy had significant effects on American society. While the depression and poverty settled in throughout America, some questioned how the country should balance its own interest and needs with those of other countries.

As you recreate an authentic historical setting, think about ways to insert your thoughts, opinions and ideas on how many situations were handled. What does social justice mean to you? How could interactions throughout history been more fair or compassionate?

In this quest, you create an adventure in the unique environment and time period of the Civil Rights Movement. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Defining the Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Investigate a minimum of three ways the NAACP, the Freedom Riders and Mississippi Civil Rights activists: Chanel, Goodman and Schwerner contributed to the Civil Rights Movement.
- Compare and contrast how the 14th amendment was instrumental in Browder vs. Gayle and Brown vs. Board of Education in at three different aspects. How did it influence outcomes and the present as we know it?
- Explain at least two similarities and three differences between Malcolm X, Martin Luther King, Elijah Mohammed and the Black Panthers.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the Mindsets of the American People:
America was very diverse and culturally rich land with people of all ethnic backgrounds. They had many diverse people, not only whites and black, but also Native Americans, Asians and Puerto Rican diaspora. After the war, many factors like the baby boom, new educational opportunities like the GI Bill and post war consumerism contributed to a changing landscape in American society that helped to start a path for Civil Rights and other suppressed people to advocate for themselves.

- Why was the Eisenhower's appointment of Earl Warren important and how does it still affect is?
- Critique the significance of Jackie Robinson in baseball.
- Explain how nonviolent tactics helped further civil rights causes quickly?
- Compare and contrast the public lives and careers of Medgar Evers, Malcolm X and Dr. Martin Luther King, Jr.
- Investigate the 16th Street Baptist Church bombing and Affirmative Action.

Know the significance of math, science and technology throughout everyday life:
The 60s were known as a decade of change and math and numbers greatly contributed to that growth. The election of JFK as president helped facilitate change as social-economic and gender and race inequalities were addressed by numerous individuals and various organizations and groups. What may appear to be seemingly small monetary gains in reality carried hugh socio-economic impact. Minimum wage and social security benefits were established and helped propel better wages and living conditions. Considering this, has minimum wage kept up with the cost of living? Support this response in your game.

Explain how past science contributed to the Civil Rights Movement:
W. E. duBois, an African American professor in the early 1900s who established the first scientific school of sociology at Atlanta University, developed the framework for what was the basis of the Civil Rights Movement and #BlackLivesMatter rests on. He was the first to use science to dispute racism of blacks being inferior to whites.

Taking it to the next level with critical thinking:
The Civil Rights Movement was a crucial period in American history. It laid the foundation for women's suffrage and provided a framework for greater equality for all oppressed individuals and communities. As a game designer, you have a wealth of opportunities and challenges to design a quest where players discover more about this painful time as they face and overcome obstacles and problem solve. Here are a few ideas:

- Tell players they are tour guides in a historical museum and must correctly match artifacts and props to the historical figures.
- Challenge players to create a detailed event with dialogue, historical references and summaries of relevance.
- Explore the importance of nonviolent tactics and create a lunch counter sit in protest.

As you continue researching and developing your masterpiece, refer back to the essential question: Is there one America or many?

- Changing demographics and growing number of elderly
- Immigration Reform and Control Act
- Ratification of the 16th Amendment
- American Indian Movement (AIM) and Protest
- United Farm Workers , Organizing Farm Labor (Cesar Chavez)
- Equality in the workplace
- Gay rights and LGBT movement (Stonewall Rebellion)
- Supreme Court and the Warren Court Era (1953-1969)
- Movement for Rights of Disabled Citizens
- Activism by disabled veterans
- Increased domestic abuse focus
- Title IX
- Ralph Nader – Unsafe At Any Speed

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Word Wall

Apply major terms and vocabulary in your quest. Examples of vocabulary that can be applied to your storyboard.

Nationalism	Sectionalism	Dynasty	Embargo	Indentured
Commodity	Antebellum	Salutary Neglect		Temperance Movement
Dissent	Aligned	Spoils System		Divine Providence

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.loc.gov/collections/civil-rights-history-project/articles-and-essays/school-segregation-and-integration/

https://www.teachingforchange.org/lessons-on-the-civil-rights-movement

https://www.pbs.org/newshour/extra/lessons-plans/the-50th-anniversary-of-the-march-on-washington-lesson-plan-a-time-for-change/

https://junior.scholastic.com/pages/content-hubs/the-civil-rights-movement.html

https://www.khanacademy.org/humanities/us-history/postwarera/civil-rights-movement/e/the-civil-rights-movement

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story.

A good storyboard depicts significant action and changes. Think about the last good book you read. The author sat down to think about exactly what would happen when.

One of the best ways to do this is to create a series of panels that almost look like a comic book. Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found.

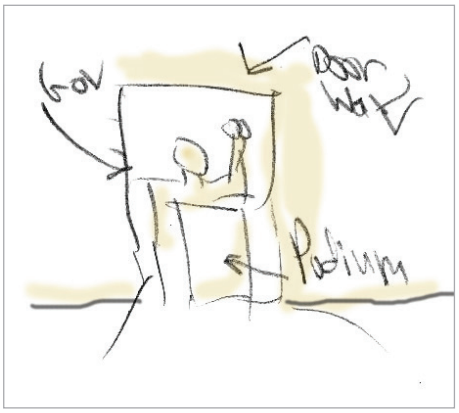
June 11, 1963 – University of Alabama

On the following page is a sample storyboard for a level recreating the 1963 University of Alabama forced desegregation that was blocked by then Governor George Wallace. The result was two African American students, Vivian Malone and James Hood, were allowed to register and attend classes. It was a milestone in the Civil Rights Movement.

Sample Storyboard for VR Quest®

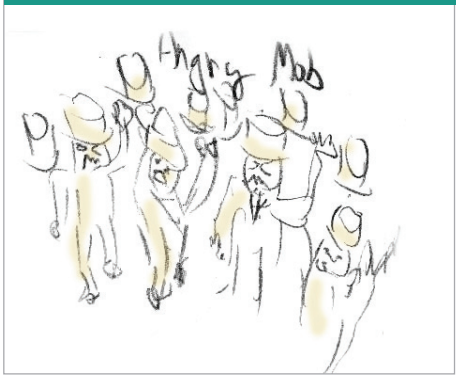
Introduction Panels 1 and 2

1. Overhead view of the scene.



2. The Governor blocked the entrance.

Body Panels 3-10



3. Angry crowd gathered outside the building.

4.

5.

6.

7.

Climax

8. The Governor being escorted away.

Summary

9. Kids entering the building.

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2-4. Maybe you don't have time to fill rooms with all the right equipment, or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period you are basing the game off of? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

For example, this image was characteristic of the conflict and pain many black Americans felt. Different artifacts from poetry, art, theater, dance, music, etc. can illustrate what daily life was like or even what emotions people were experiencing during that time period. Remember, art is often used as an outlet or to release stress.

06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take It Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

Curricular Alignment

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Analyze Argument Cause/ Effect Claims Classification	W.11.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	States and verifies what is known about the problem or question and makes connections to prior knowledge. Writes questions independently based on key ideas or areas of focus.	1.A1 1.A2 IV.A1 II.A2	6c 4c 6a 3a
Comparing Contrasting Counterclaims	a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole;	Analyzes and evaluates what is known, observed or experienced to form tentative thesis or hypothesis. Determines what resources will most likely offer quality information.	IV.A1 IV.A2 IV.A1	3b 5c 5c
Dialogue Domain Specific Vocabulary Evidence	include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.	Considers culturally divergent and opposing viewpoints on topics.	II.A2 V.A1 I.D1	1a 1b 3c
Explanatory Text Facts	b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	Uses the categorization of materials within Dewey areas to locate resources and browse for additional materials.	III.B1 IV.B1	6d 3a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Graphics Informational Text	c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	Uses technology resources such as online encyclopedias, online databases, and Web subject directories to locate information on assigned curriculum topics.	IV.B4 III.B2	4b 5b
Key Details Main Topic Multimedia	d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.	Uses organizational systems and electronic search strategies - key words, subject headings) to locate appropriate resources.	II.B3 IV.C1	1b 4c
Narrative Organization Pacing	e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	Uses multiple sources to acquire background information and brainstorms ideas for further inquiry.	1.C1 VI.B2 VI.B3	3d 4a 4d
Point of View	f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).	Questions the differences between sources and seeks additional sources to resolve.	V1.B2	6d

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Relationships Sequencing Visual Information	W.11.3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events. b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters. c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).	Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy. Uses both facts and opinions responsibly by identifying and verifying them. Takes notes by paraphrasing or using quotation marks when using someone else's words. Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy. Uses both facts and opinions responsibly by identifying and verifying them. Interprets information and ideas by defining, classifying, and inferring. Uses common organizational patterns to organize information in order to draw conclusions.	III.B2 I.B3 VI.C1	3b 3a 4a
Audience	d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.	Forms opinions and judgments backed up by supporting evidence.		
Organization	e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	Publishes final product for a particular audience and purpose. Interprets information and ideas by defining, classifying, and inferring.	VI.C2	6d

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Purpose	f. Adapt voice, awareness of audience, and use of language to accommodate a variety of cultural contexts. W.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	Considers culturally divergent and opposing viewpoints on topics.	III.B1	6b
Analyzing Claims Comparing Contrasting Evaluating	W.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	Uses common organizational patterns to organize information in order to draw conclusions. Cites all sources used according to local style formats. Publishes final product for a particular audience and purpose.	II.B3 I.C3 I.D1 IV.D1 II.D1	6a 2c 3b 3b 3b
Evidence Informational Texts Questioning Reasoning	W.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. a. Explore topics dealing with different cultures and world viewpoints.	Uses interactive multimedia tools to exchange data collected and to learn curricular concepts by communicating with peers, experts and other audiences. Determines what resources will most likely offer quality information Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy.	IV.D1 I.D1 I.D4 VI.D1	3d 5c 1b 1d

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Quotation Audience Purpose	W.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. W.11.11 Create interpretive and responsive texts to demonstrate knowledge and a sophisticated understanding of the connections between life and the literary work. a. Engage in using a wide range of prewriting strategies, such as visual representations and the creation of factual and interpretive questions, to express personal, social and cultural connections and insights. b. Identify, analyze, and use elements and techniques of various genres of literature, such as allegory, stream of consciousness, irony, and ambiguity, to affect meaning. c. Develop innovative perspectives on texts, including historical, cultural, sociological, and psychological contexts. d. Create poetry, stories, plays, and other literary forms (e.g. videos, artwork.	Uses technology resources such as online encyclopedias, online databases, web subject directories to locate information on assigned topics in the curriculum. Forms opinions and judgments backed up by supporting evidence. States and verifies what is known about the problem or question; makes connections to prior knowledge. Writes questions independently based on key ideas or areas of focus. Analyzes and evaluates what is known, observed, experienced to form tentative thesis or hypothesis. Uses organizational systems and electronic search strategies (keywords, subject headings) to locate appropriate resources Uses table of contents, index, chapter and section headings, topic sentences and summary sentences to locate information and select main ideas. Uses the structure and navigation tools of a website to find the most relevant information. Uses both facts and opinions responsibly by identifying and verifying them. Takes notes by paraphrasing or using quotation marks when using someone else's words. Evaluates and paraphrases information that answers research questions. Cites all sources used according to local style formats.	V.B1 III.A1 V.D3 IV.D2	2b 2c 7 6d

VR Quest® STEAM Curriculum Guide
12th Grade English

Julius Caesar

Hamilton Buhl
Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Social Emotional Learning is prompted as scholars will be prompted to identify situations where social action is required, as well as possible solutions. Scholars will also reflect on how they can best influence people's rights and freedom through advocacy and connecting with people and/or leaders in positions of power.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun-filled ride. You are the creator of this journey into literacy and history with one of Shakespeare's finest works, Julius Caesar. As the adage so eloquently states: "Reading opens the door to unlimited knowledge."

As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos and text.

Prepare to travel through the world of power, strife and politics as you gain insight into people, relationships and make meaning of fate versus free will. As you begin to develop questions about themes of power, better understand communication, cowardice and different personalities, you will be able to explain how these all are inter-related to each other.

In this quest, you create an edventure in literacy and history or a learning walk. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain the significance of relationships in politics within a 20 minute time period
- Determine the premise of logic versus language in both public and private actions over a 45 minute period
- Create a time line of significant events during a 45 minute time span
- Compare and contrast the heroes vs. villains within a 30 minute period

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

Assess the applications of character in our lives:

Most people believe in doing the right thing and doing what is for the good of all. However, sometimes what is actually in the best interests of the majority comes into question. For example with the Covid 19 virus, no one wants to die and no one wants to be responsible for causing others to inadvertently get sick and die. Yet some people have illustrated their character by refusing to wear masks, deliberating coughing on others, or stating the virus is a hoax.

- How did personality come to light during the 2016 presidential election?
- Compare and contrast two public figures in terms of character traits.
- Determine everyday implications for illustrating how one can act in the interests of the greater good.
- Define three positive traits you adhere to with examples.

Know the significance of art, science and technology throughout American history:

Julius Caesar is an exemplary piece of work from William Shakespeare that can also be applied to many STEM concepts. Digitally, the story elements (characters, plot, settings and unique language) of the play can be made into an infographic, poster or other art form detailing family, relationships, famous phrases, language and wit, phases of the moon in relationship to action and/or compared to other Shakespeare's works. Translations and written works can also be incorporated.

In terms of math, patterns and relationships are highly evident throughout the work. Julius Caesar was well known for the shift cipher, which was also known as Caesar's cipher. Simply explained, this is a coded encryption technique where all letters are changed with another letter from a fixed number of positions further in the alphabet. Hence, a mathematical pattern is presented. With regard to science, scholars can recreate Caesar's ancient scrolls through chemical reactions and aging techniques.

Explain how past practices are current and still used today:

In life, relationships are the key to everything. What happened in Julius Caesar is not new to life, politics or friendships. Power, betrayal, false friendships, self-preservation, ethics and questioning principles are issues that occur every day.

In today's current politics, especially during an election year, you will see alliances and small victories similar to that of this work. Additionally, in many real life instances, one can see others being morally strict with high expectations, but hypocritical in everyday practices much like Brutus was.

Taking it to the next level with critical thinking:

Time has shown us over and over that history truly does repeats itself. Shakespeare's works have often drawn parallels or been used for the basis in the arts for other works. Strong characters and engaging plots draw in readers and influence people, actions and situations by becoming memorialized or bringing alive a chain of events. As people with their own agenda become more nationally concerned with conspiracy theories, fighting the status quo or involved in a cause, we see the same laser like focus, character traits or conflicts begin to evolve.

- Determine and describe how a current national situation is similar to the plot of Caesar.
- Identify character traits in regard to human relationships.
- Explain Brutus faced poetic justice and connect it to a real life public figure.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Critical thinking of Julius Caesar with respect to bravery, truth and the belief of free will verse fate provides a wealth of opportunities and challenges to create the life scholars desire, as well as design a quest where players discover better understand what is important in life. Here are a few ideas:

- Tell players to utilize various globes, maps and documents to show the location of the various settings and have them create a timeline of the plays' events, significant action and major highlights.
- Specific events and political conditions influence leader' actions. Illustrate the major turning points in the relationships and plot with respect to action and character development. What character traits are noticed? In what regard did Brutus's greatest virtue become his deadliest flaw? Support with text evidence.
- Create a museum gallery walk comparing and contrasting Caesar to Brutus. Analyze their characters and their personalities/traits. Use text evidence to support your reflection.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.britannica.com/biography/Julius-Caesar-Roman-ruler

https://www.ancient.eu/Julius_Caesar/

https://www.history.com/topics/ancient-history/julius-caesar#:~:text=%20Julius%20Caesar%20%201%20Early%20Life%20of,tribune%20and%20then%20quaestor%20of%20a...%20More%20

https://www.youtube.com/watch?v=4nT6ifKkhrY

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story. A good storyboard depicts significant action and changes.

Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book.

Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction
Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body
The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax
A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary
The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found. On the following page is a sample storyboard for a Mediterranean World Byzantine Empire quest.

Sample Storyboard for VR Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Metacognitive Accountable Talk Extension Stems

Based on the evidence…

The key information indicates/identifies/explains...

This reminds me of…

This is relevant because…

In summary, this means...

To expand/piggyback off of what _____ said...

I infer this represents…

I used to think _____, but now _____

What's important here is...

It's interesting that...

One thing we should notice is...

One thing we haven't considered is...

Accountable Talk Vocabulary Verbs

Analyze	Trace	Describe
Infer	Compare	Explain
Summarize	Support	Formulate
Predict	Evaluate	Contrast

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

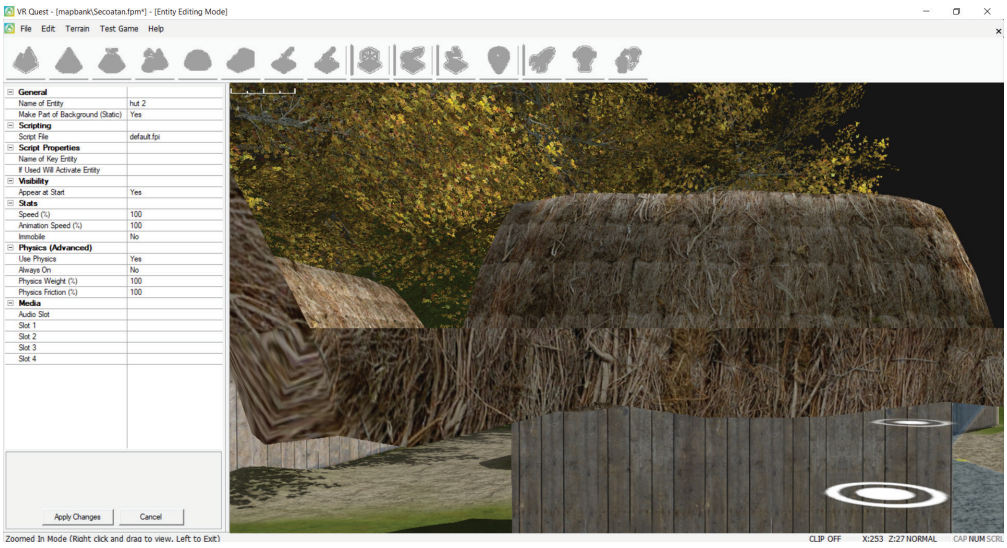
Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

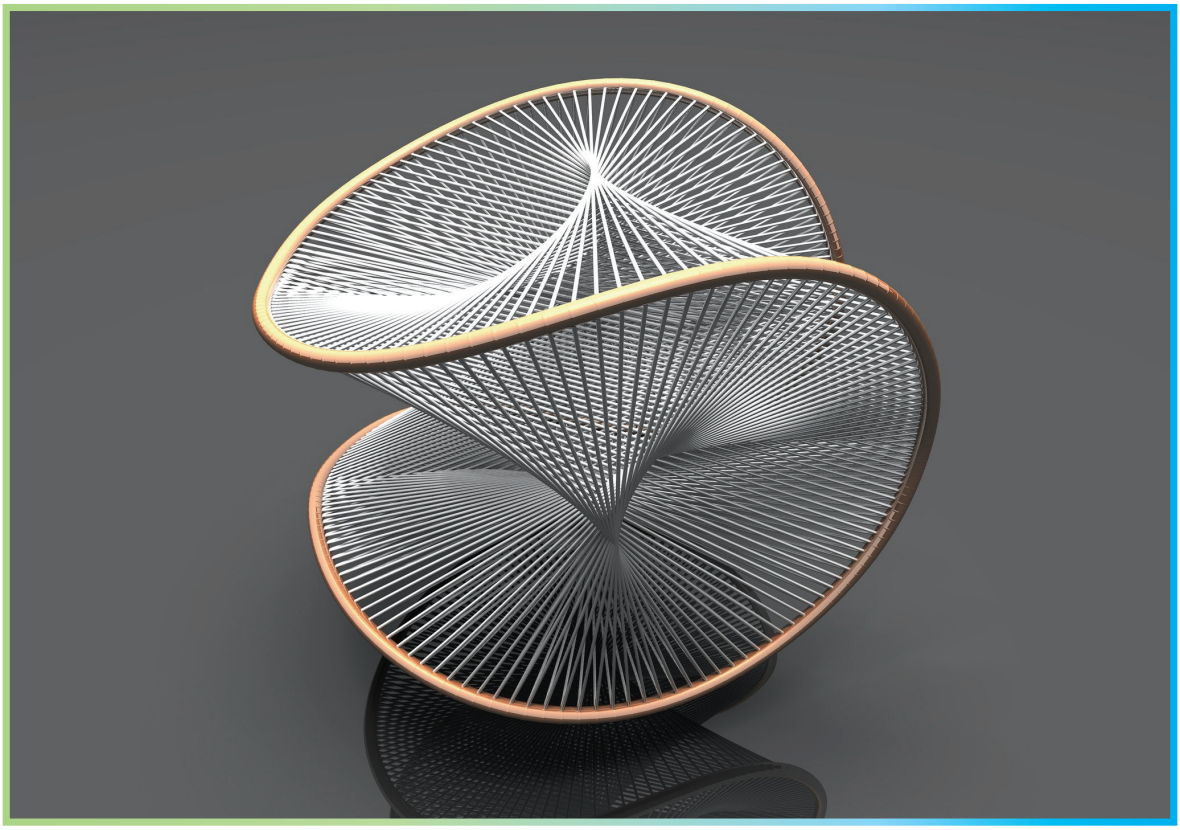
Curricular Alignment

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Author's Perspective	11-12R1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly/implicitly and make logical inferences, including determining where the text is ambiguous; develop questions for deeper understanding and for further exploration.	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary		Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	11-12R2: Determine two or more themes or central ideas in a text and analyze their development, including how they emerge and are shaped and refined by specific details; objectively and accurately summarize a complex text.	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts			I.B1	5c
Illustrations		Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	IV.C1	3c
Informational Texts	11-12R3: In literary texts, analyze the impact of author's choices. In informational texts, analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop.	Uses pre-selected Web resources to locate information.	V.A1	2b
Key Details		Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	III.B1	3d
Narrative	11-12R4: Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings.	Uses various note-taking strategies.	IV.D1	6a
Opinion		Uses common organizational patterns to organize information.	II.D2	1b
Organization	Analyze the impact of specific word choices on meaning, tone, and mood, including words with multiple meanings.	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	I.B2	1b
Point of View		Identifies and evaluates the important features for a good product.	I.A2	3c
Quotations	Analyze how an author uses and refines the meaning of technical or key term(s) over the course of a text.	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.	VI.A2	

DOK Tags	Next Generation	IFC Standards	AASL	ISTE
Reasoning **Sequence of Events**	11-12R5: In literary texts, analyze how varied aspects of structure create meaning and affect the reader. In informational texts, analyze the impact and evaluate the effect structure has on exposition or argument in terms of clarity, persuasive/rhetorical technique, and audience appeal. 11-12R6: Analyze how authors employ point of view, perspective, and purpose, to shape explicit and implicit messages (e.g., persuasiveness, aesthetic quality, satire, sarcasm, irony, or understatement). 11-12R7: In literary texts, analyze multiple adaptations of a source text as presented in different formats (e.g., works of art, graphic novels, music, film, etc.), specifically evaluating how each version interprets the source. In informational texts, integrate and evaluate sources on the same topic or argument in order to address a question, or solve a problem. 11-12R8: Delineate and evaluate an argument in applicable texts, applying a lens (e.g. constitutional principles, logical fallacy, legal reasoning, belief systems, codes of ethics, philosophies, etc.) to assess the validity or fallacy of key arguments, determining whether the supporting evidence is relevant and sufficient. 11-12R9: Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences.	Paraphrases and summarizes information that answers research questions. Uses common organizational patterns to organize information. Understands the concept of "audience;" determines audience before creating product. Understands the basic concept of plagiarism as copying the work of others. Drafts the presentation / product. Assesses and revises own work with guidance Asks questions to clarify topics or details. Understands the concept of "audience;" determines audience before creating product. Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others. Restates ideas of others accurately and adds own perspective.		
Audience	Identifies and evaluates the important features for a good product.	III.C2	6d
Organization	Understands the basic concept of plagiarism as copying the work of others.	III.B2	6a
Purpose	Identifies facts and details that support main ideas.	VI.C2	7b

VR Quest® STEAM Curriculum Guide
12th Grade

Calculus



Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student with an emphasis on social emotional learning.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

Additionally, the VR Quest® STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences

Through its multi-ethnic characters, settings and variables, VR Quest® showcases different cultures and heritages as valued assets to learning and offers an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.

The VR Quest design screen

The Journey Begins

Now put on your seatbelts and get ready for a fun filled ride. You are the creator of this journey into Calculus, the mathematical study of continuous change in real time. As you make this game richly unique with content knowledge, the player participants will be focused on accomplishing the games' objective or guided through an experience while being stimulated by audio, images, videos, and text. Prepare to travel into a world of functions, limits, derivatives, and integrals.

Calculus is all around us. Calculus is one of the grandest achievements of human thought, explaining everything from planetary orbits to the optimal size of a city to the periodicity of a heartbeat. Travel through the different portals of how Calculus is used in the real world. Among the disciplines that use Calculus include Physics, Engineering, Economics, Chemistry, Statistics, and Medicine to name a few. You can create a virtual experience immersed in how Calculus effects our daily lives through its applications and practical use.

Examples of applications of Calculus:

1. In the field of Chemistry, Calculus can be used to predict functions such as reaction rates and radioactive decay.

2. In the field of Biology, Calculus is used to formulate rates such as birth and death rates.

3. In the field of Economics, Calculus is used to compute marginal cost and marginal revenue, enabling economists to predict maximum profit in a specific setting.

4. In the area of rocket propulsion, Calculus is used to calculate how high the rocket can fly based on how many engines, fuel capacity and the mass of the rocket.

5. In the practice of medicine, Calculus is used in the calculation of proper dosage rates of medicine given to patients.

DID YOU KNOW?

Maria Gaetana Agnesi (1718-1799) wrote the first mathematics handbook that included both differential and integral Calculus. She was the western world's first women mathematician and first women appointed professor at a university.

In this quest, you create an adventure or museum gallery centered around calculus history, equations, and applications.

The graphic on the following page outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The 7 Steps of VR Quest®

01 Establishing an Objective (Step 1)

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

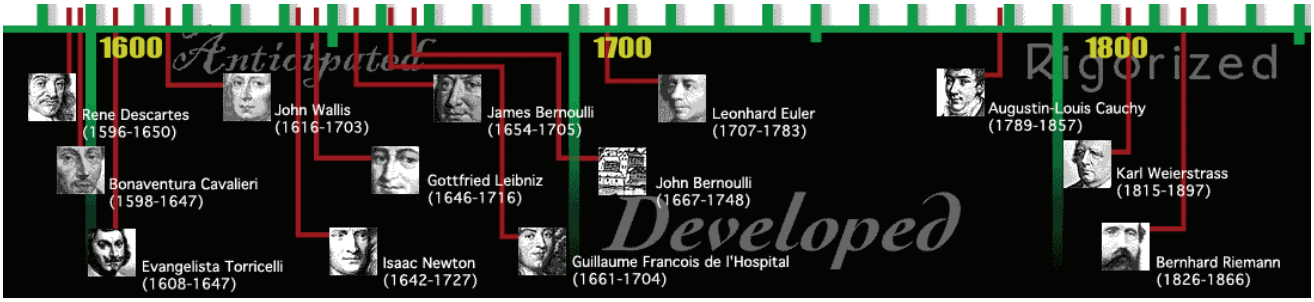
Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Explain why Calculus matters and how it affects real world scenarios in Physics, Chemistry, Biology, Economics, Engineering and Medicine.
- Recognize the key differences and relations between the two main categories of calculus: Integral and differential.
- Calculate the speed of a rocket in earth's gravity field at a specific time and given initial conditions.
- Use integration in Architecture to determine the number of materials necessary to construct a curve dome over a new sports arena.
- Create a timeline and museum gallery walk of significant mathematicians and cycle of Calculus through three stages: Anticipation, Development, and Rigorization.



Example: Timeline displaying three periods and prominent mathematicians in the development of Calculus.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk.

Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating (Step 2)

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research (Step 3)

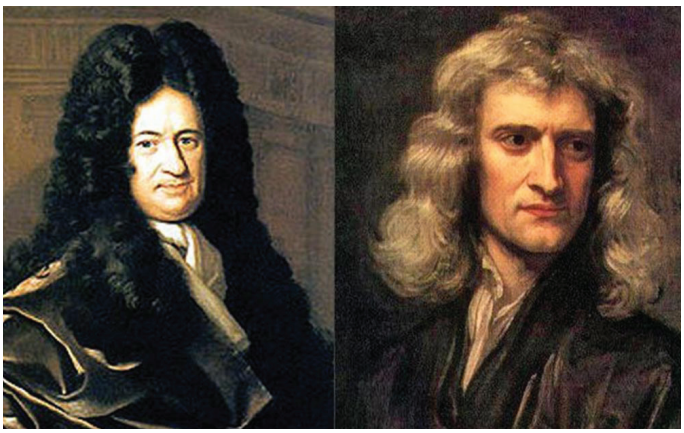
Use the objectives you wrote in Step 1 to guide your research answering any questions. Here's some of the research associated with the objectives in our example:

The Significance of Calculus

The most important branch of mathematics is calculus. Calculus studies phenomena involving change along dimensions, such as time, force, mass, length, and temperature. Before calculus was invented, all math was static. Studying calculus is important because it provides a basis for understanding mathematical concepts and helps a person develop practical scientific and engineering sense, thinking ability and problem-solving skills. In calculus, there are two different fields namely, Differential Calculus and Integral Calculus.

- Explain why the historical periods of Anticipation, Development and Rigorization were critical in putting Calculus in the logically sound foundation that exists today.
- How are concepts of differential and integral calculus linked together by the fundamental theorem of calculus? Differential calculus is concerned with the measurement of the rate of change. Integral calculus is the inverse of finding differentiation and is used to calculate the area under a curve.
- Explain how an Architect would use Calculus to design and construct a building with different shapes, curves and angles. Hint: A 3D structure with a curved surface like a dome would need to be divided into pieces of constant densities to calculate its area.
- Using antiderivatives and integrals, we can calculate the height and velocity of the Space Shuttle when knowing the total mass of the shuttle, the amount of fuel included in the total mass and Newtons of force produced by the booster and shuttle engines. How does gravity affect the results?
  (Hint: apply Newton's second law of motion F = ma.)

DID YOU KNOW?



Around the 1670s, Gottfried Wilhelm Leibniz (1646-1716) of Germany and Sir Isaac Newton of England (1642-1727) discovered and developed Calculus independently of each other.

Know the significance of art, science and technology throughout United States American history:

Calculus is math in motion. It's the calculation of change used to help describe the dynamic nature of our world. Calculus is used in many fields and careers. For example, in meteorology, differential calculus is used calculate the effects of changing weather conditions in the atmosphere by applying such variables as temperature, pressure changes. These help meteorologists to predict the weather.

In the art of music, Calculus is used to calculate damped harmonic motion and establish different frequencies for oscillation.

In business, Calculus is used by credit card companies to set payment structures, they consider different variables such as changing interest rates and fluctuating balances to calculate the minimum amount due on a credit card.

In medicine, anesthesiologists use Calculus to calculate the velocity of blood flow in an artery or vein at a given point and the volume of blood flowing through the artery, to help keep the patient under anesthesia.

DID YOU KNOW?

Leonhard Euler (1707-1783) was the first mathematician to apply Calculus to real-life problems in physics. He published writings on topics such as shipbuilding, acoustics, astronomy, optics and mechanics.

(by Jakob Emanuel Handmann. This image derived from Leonhard Euler. jpg Edited by: BammeskOriginal source: Kunstmuseum Basel, Public Domain, https://commons.wikimedia.

Explain how past practices are current and still used today:

In the eighteenth-century infinitesimal calculus was introduced into the field of social science starting with neoclassical economics. Neoclassical economics was an approach to economics in which the production, consumption, and valuation (pricing) of goods and services were driven by the supply and demand model. Mainstream economics today still uses infinitesimal calculus as a valuable tool for market activity and the supply and demand model.

Additionally, in the nineteenth-century mathematician Joseph Fourier used Calculus principals to determine the temperatures of the atmosphere. Fourier's consideration of the possibility that the Earth's atmosphere might act as an insulator of some kind is widely recognized as the first proposal of what is now known as the greenhouse effect.

Today scientists apply Calculus to study climate changes affected by atmospheric temperatures and the amount of carbon dioxide added to the air as a catalyst.

DID YOU KNOW

Caroline Herschel (1750-1848) was the first woman to be credited with detecting a new comet. During her life as an astronomer, Caroline Herschel discovered a total of eight new comets. She used Calculus in the tracking of celestial objects.

Taking it to the next level with critical thinking:

Calculus is all around us and influences our daily lives. Here are a few ideas to add

depth to your virtual reality game.

Calculus is used in sports to improve performance. Calculus can be used in basketball to find the exact arc length of a shot from the shooter's hands to the basket. The moment the basketball is released from the shooter's hands, its traveling path creates an arc all the way to the net. Using the angle of release and strength of the release, one can mathematically predict the travelling path and the length of the arc. While the ball is in the air, it is affected by only one force, which is gravity! **Hint**: you must include the horizontal and vertical direction of the ball, the velocity, and the hoop size as your variables.

Architects and civil engineers must take calculus as a course of study to practice their profession. As you are planning the design of a new city, create buildings with different shapes and curves. Use Calculus to find the area under a curve, or the area of two intersecting curves. This is important because with the area and surface volume, you can then calculate the amount of materials needed and cost of the project.

You are preparing to travel to the moon again. A base station is awaiting your arrival. Use Calculus to calculate how fast the rocket is going at different intervals. As the rocket is rising higher, fuel is consumed and the mass of the rocket decreases. When you reach space, use Calculus to predict where the moon will be later in the orbit to avoid missing your target. Once you get closer to the moon, there is less gravity from earth and more from the moon. Use Calculus to verify how much you need to decelerate to avoid crashing into moon. Your rocket is constantly changing its status over time. Hint: Differentiation is used to study how fast an object is moving and what it is doing at a particular point. Integration is used to study how an object evolves over time.

VR Quest® encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.khanacademy.org/math/calculus-1

https://www.mscs.dal.ca/~kgardner/History.html

https://www.embibe.com/exams/real-life-applications-of-calculus/

https://www.mathsisfun.com/calculus/

https://mathcs.clarku.edu/~ma120/calcorigins.html

https://pressbooks.online.ucf.edu/phy2048tjb/chapter/9-7-rocket-propulsion/

https://www.technocrazed.com/1-4-how-derivatives-and-integrals-relate-to-one-another

https://amsmathcon.wixsite.com/numbersdemystified/post/the-impact-of-calculus-to-the-modern-world

https://www.scienceabc.com/pure-sciences/what-exactly-is-calculus-how-do-we-use-it-in-everyday-life.html

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard (Step 4)

For a game experience make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations, and dialogue of the order of your story. A good storyboard depicts significant action and changes. Think about the last good book you read. The author sat down to think about exactly what would happen when. One of the best ways to do this is to create a series of panels that almost look like a comic book. Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it. Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place! Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses everything they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

To create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found.

Sample Storyboard for the Calculus Quest®

Introduction Panels 1 and 2		Body Panels 3-10
1.	2.	3.
4. P	5.	6.
7.	8.	9.
10.	Climax 11.	Summary 12.

Math Vocabulary Word Wall

Antiderivative	Coefficients	Collinear	Continuity	Cosine	Cotangent
Decomposition	Derivative	Discontinuity	Divergence	Domain	Eccentricity
Equation	Exponentials	Infinity	Integral	Irrational	Limit
Linear	Notation	Orthogonal	Parabola	Parameter	Polynomials
Quadratic	Rational	Symmetry	Sequence	Theorem	Torque
Velocity	Variable	Relative Minimum	Relative Maximum		

Math Vocabulary Verbs

Analyze	Apply	Calculate	Classify	Compare	Compose
Convert	Decompose	Demonstrate	Derive	Describe	Determine
Develop	Differentiate	Distinguish	Evaluate	Explain	Explore
Express	Fluent	Generate	Identify	Interpret	Justify
Know	Make	Prove	Recognize	Reference	Represent
Solve	Specify	State	Understand	Use	Verify
Written Method/ Representation					

05

Build the Interface (Step 5)

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest® software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2 - 4. Maybe you don't have time to fill rooms with all the right equipment or build a complex series of underground tunnels. Perhaps you're not exactly sure what equipment would be found in a space lab and need to do more research. The story might benefit from a bit more brainstorming.

How could you include different artifacts relevant to the historical period your game is describing? Would it be a series of different artifacts that will help the player participants learn more or would it be one artifact that is continually acquired?

06

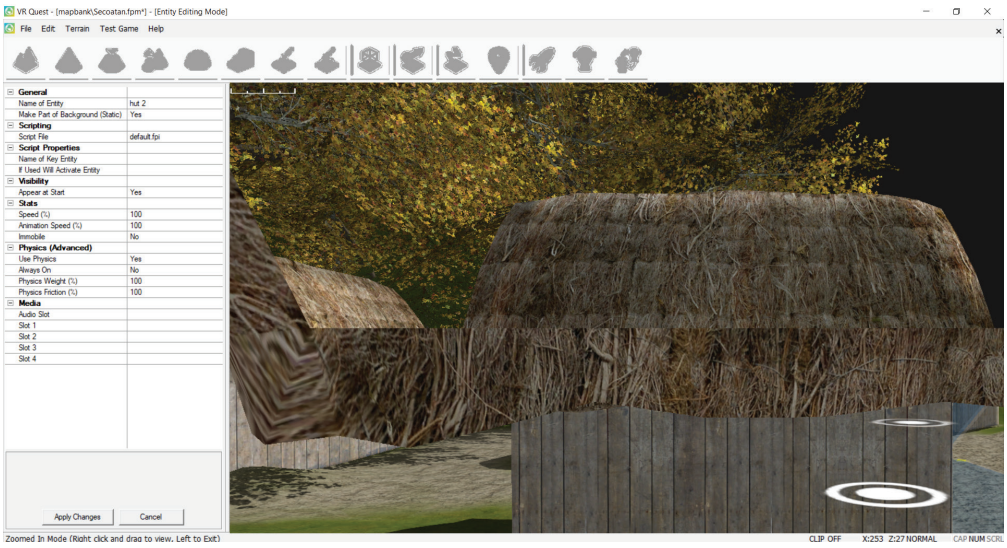
Pilot Test (Step 6)

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.



07

Revise (Step 7)

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they could not move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did every interactive feature work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take it Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!

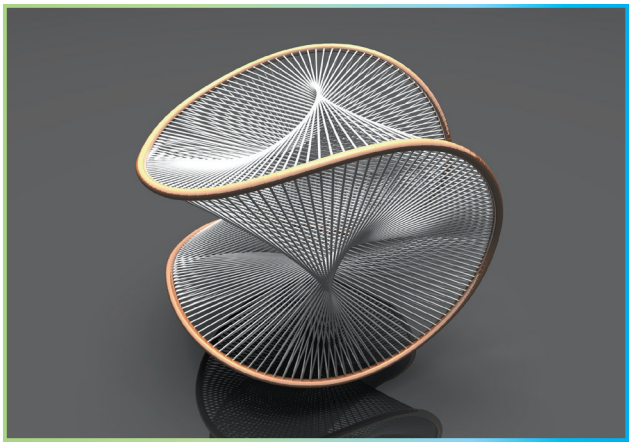
Curricular Alignment

DOK Tags	IFC Standards	AASL	ISTE
Author's Perspective	Predicts answers to inquiry questions based on background knowledge and beginning observation or experience.	I.A1	3d
Domain Specific Vocabulary	Distinguishes between fact and opinion.	V.A2	1b
Explanatory Texts	Identifies facts and details that support main ideas. Follows a model or template provided to complete inquiry project and follows a timeline. Asks questions to clarify topics or details.	I.D1	3d
Facts	Generates a list of key words for a research-based project with guidance. Uses selected search engines to find appropriate information.	I.B1	5c
Illustrations	Uses pre-selected Web resources to locate information.	IV.C1	3c
Informational Texts	Selects and uses multiple appropriate print, nonprint, electronic and human sources to answer questions.	V.A1	2b
Key Details	Uses various note-taking strategies.	III.B1	3d
Narrative	Uses common organizational patterns to organize information.	IV.D1	6a
Opinion	Uses pre-writing to brainstorm ideas for most effective way to present conclusions.	II.D2	1b
Organization	Identifies and evaluates the important features for a good product.	I.B2	1b
Point of View	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.	I.A2	3c
	Restates ideas of others accurately and adds own perspective.		

DOK Tags	IFC Standards	AASL	ISTE
Audience	Paraphrases and summarizes information that answers research questions.	VI.A2	3c
	Uses common organizational patterns to organize information.		
	Understands the concept of "audience;" determines audience before creating product.	III.C2	6d
Organization	Understands the basic concept of plagiarism as copying the work of others.		
	Drafts the presentation/product. Assesses and revises own work with guidance.		
	Asks questions to clarify topics or details.	III.B2	6a
	Understands the concept of "audience;" determines audience before creating product.		
Purpose	Recognizes the right to express own opinion in an appropriate manner, even when the opinion differs from the ideas of others.		
	Restates ideas of others accurately and adds own perspective.		
	Identifies and evaluates the important features for a good product.	VI.C2	7b
	Understands the basic concept of plagiarism as copying the work of others.		
	Identifies facts and details that support main ideas.		

VR Quest® STEAM Curriculum Guide
12th Grade

Calculus Prologue



Derivatives and Rates of Change

Hamilton Buhl®
Never-Ending Learning Innovation

Prologue

It is the year 2030 and humankind is at the cusp of sending the first humans on a mission to Mars. The interstellar rocket Mars Quest 1 stands at its launch pad on a crisp December morning at Cape Canaveral.

The five future Martians sit in their command module on top of the rocket in constant communication with mission control. All five outstanding scientists, all five exceptional mathematicians. The countdown to launch has begun.

The radar stations responsible for tracking the trajectory and velocity of the rocket are 5 miles from the launch pad and are ready. Our host from the past for this adventure is none other than Sir Isaac Newtown, one of the co-discovers of modern Calculus and the architect of the laws of motion in Physics and Mathematics.

Newton: "Welcome questers to your adventure in the world of Calculus. I will be your host and guide you in this quest to travel to Mars using Calculus to decipher the speed of the rocket at different altitudes. Your challenge awaits across space and time. Go and explore."

Cape Canaveral Launch Pad 2

Mission Control:
Mars Quest 1 we have begun our countdown to lift off T-60 seconds and counting. All systems are normal. What is your status?

Mars Quest 1:
Roger Mission Control, we are ready to embark on this quest to Mars. All systems go in command module.

Mission Control:
T-20 seconds. Commence primary ignition of main rocket engines.

Mission Control:
T-0 and we have lift-off, lift-off of the Mars Quest 1 rocket.

Mars Quest 1:
Mission Control: vibration normal, propellent stable, oxygen stable, trajectory stable!

Radar Station Alpha:
Mar Quest 1, you are currently at altitude 7 miles. Your distance from the radar station is increasing at 2000 miles/hr.

Mars Quest 1:
Roger radar station alpha. How fast is the rocket rising at our current altitude?

NEWTON APPEARS

Questers, let's pause for a moment and review our current situation.

Mars Quest 1 is asking for the rate of change in the height of the rocket in respect to time.

Question 1:
What rate equation best describes this?

1. dy/dt = ?
2. dy x dt = ?
3. dy – dt = ?
4. 2dy/dt = ?

Answer 1:
correct dy/dt = ?

If answer is correct, quester receives 1 fuel packet. Fuel is life for journey to Mars.

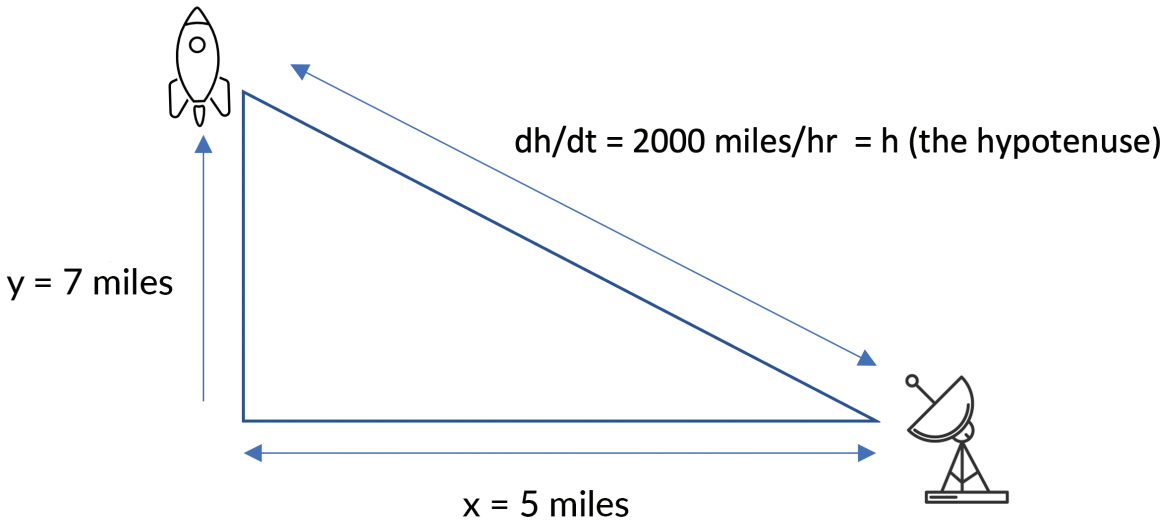
Let us look at our variables:

x = 5 miles is distance of radar station from rocket launch pad

y = 10 miles is the current altitude of the rocket after lift-off (this is constantly changing)

dh/dt = 2000 miles/hr is the rate at the which the rocket is increasing its distance (miles) from the radar station in respect to time (hours).

Let us represent the different variables in form of a triangle.



We want to know the answer to dy/dt = ?

Using the hypotenuse theory for the triangle, $x^2 + y^2 = h^2$. This gives us three variables.

Question 2:
Which variable in the hypotenuse theory equation is a constant value?

1. x
2. y
3. h

Answer 2:
correct, x.
Quester receives 1 fuel packet. Fuel is life for journey to Mars.
x is constant because the radar station is a fixed length of 5 miles from the launch pad.
There is a relationship between variables y and h.

We now take the derivative of both sides of the equation with respect to time.

$d/dt(x^2 + y^2) = d/dt(h^2)$

Question 3:
True or False: The d/dt of the constant x is zero.

1. True
2. False

Answer 3:
Correct, True. x = 5 is a constant and there is no rate of change based on time.
If answer is correct, quester receives 1 fuel packet. Fuel is life for journey to Mars.

$d/dt(x^2 + y^2) = d/dt(h^2)$

$2y\ dy/dt = 2h\ dh/dt$ (the 2s cross out)

$y\ dy/dt = h\ dh/dt$

$dy/dt = h/y\ dh/dt$

We return to the hypotenuse equation and we plug in our variables.
We need to know y and h.

Let us calculate for h:
$x^2 + y^2 = h^2$ ——— $h = \sqrt{x^2 + y^2}$

Let's substitute for h in dy/dt equation:

$dy/dt = \sqrt{x^2 + y^2}/y \; dh/dt$
dy/dt (when $x = 5$ and $y = 7$) $= \sqrt{5^2 + 7^2}/4 \; (2000)$
$dy/dt = ?$

Question 4:
What is the value of dy/dt? You may round off.
1. 4301
2. 6561
3. 5335

Answer 4:
Correct, the answer is 4301 miles/hr
If answer is correct, quester receives 1 fuel packet. Fuel is life for journey to Mars.

Radar Station Alpha to Mars Quest 1:
The rocket is rising in altitude at 4301 miles/hr.

Mars Quest 1:
Roger radar station alpha. Yahoo! Next stop is Mars.

VR Quest® STEAM Curriculum Guide
12th Grade Social Studies

American Democracy and Women's Suffrage

Never-Ending Learning Innovation

Table of Contents

Please refer to the VR Quest® User Manual available at www.vrquest.hamiltonbuhl.com/user-manual for hardware requirements and step-by-step instructions on how to play.

VR Quest® STEAM Curriculum Guide Introduction

VR Quest® is pleased to introduce its STEAM virtual reality platform using the best digital content to create a transdisciplinary education product that emphasizes social emotional learning. Designing games strengthens academic concepts by reinforcing content knowledge and expands skill sets with reliance on logic, probability, geometry and other mathematical principles.

VR Quest's® **STEAM** curriculum challenges students to create, innovate, and problem solve – all while connecting them to history, science and real-world events and issues that affect their lives. It includes extensive support for teachers such as embedded professional development and instructional resources to support a differentiated learning experience for each student.

The **Science** component can be best seen through scholars being able to create various physical environments and natural resources that will influence their characters and the game. There are landforms, geographic and climate factors that scholars account for during the game's design.

Technology is evident as VR Quest® provides a full virtual reality experience for the user, but also fosters problem solving while building mindset and skills. Additionally, the game creator has the option of focusing on the game design, presentation and story, there are also elements of the programming language, LUA that can differentiate the experience for scholars.

The **Engineering** process is facilitated through the design implementation. Scholars are consistently planning, designing and building their creations. When the design process is completed, the game must be piloted or tested out. By determining if there are glitches or does not run as anticipated, scholars are able to fail, regroup and correct the approach.

Art is the actual creation process and the aesthetics of the game or how one artistically perceives what is being created. The design concepts being facilitated while the placement of colors and variety are consistently addressed.

The **Math** component is seen through sizing, scales, ratios, proportions and rotational axis. In the creation process, creators utilize logic, probability, geometry and various other mathematical principles. Scholars will need to visualize and generate geometric shapes. Using visual examples and models, they will demonstrate how formulas work.

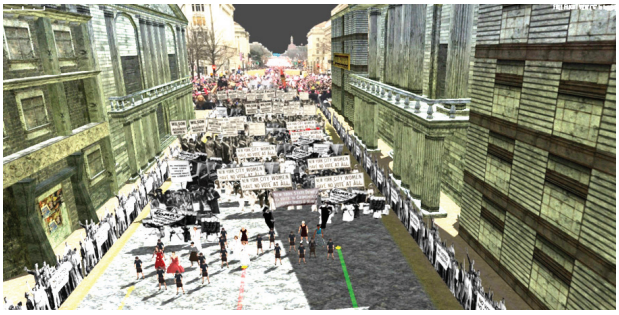
Additionally, the VR Quest STEAM curriculum supports ENL programs as it creates equitable opportunities for scholars to develop social and academic language while improving their performance and constructing meaning. In order to accomplish this goal, scholars engage in all domains of language acquisition (listening, speaking, reading, and writing) while being active participatory learners through inquiry within meaningful contexts and authentic experiences.

Through its multi-ethnic characters, settings and variables, VR Quest® has the ability to showcase different cultures and heritages as valued assets to learning and offer an opportunity for the learning community to expand its understandings of global awareness international mindedness.

Regardless of whatever communication level an ENL student is at, he or she can display knowledge and create something special unique while reinforcing written and spoken English.

As a classroom or content teacher:

- Collaborate with other teachers in different disciplines and grades about the most important concepts and skills to be taught and transferred into the game.
- Seek out the school librarian to support the research and to design instructional curriculum maps.
- Implement assessment rubrics with information fluency skills to guide the design process.
- Incorporate students' knowledge and use of multimedia resources.



The VR Quest Level Design Screen

The Journey Begins

Using the latest technology, Virtual Reality now places you in control of your journey into the past. VR Quest software utilizes simple yet powerful tools to re-create scenes from history. Example levels are provided to demonstrate the capability of the software to place the user into a simulated environment designed around an event or locale. The experience is complete with detailed stereographic 3D buildings, objects and characters surrounding the user as they are placed inside a new world to explore. Sounds, images, videos and special effects all add to the suspension of disbelief providing a nearly tangible reality. The idea of "You are there" is reinforced as the user reacts to the simulation much as they would in the real world by naturally looking around and moving effortlessly to explore new locations or examine in detail specific areas of interest.

Prepare to travel through the United States and reflect on the importance of American democracy during the Age of Enlightenment. In the Bill of Rights and the Constitution, the principles of American democracy are reflected. This is particularly evident in the organization and actions of federal, state, and local government entities. To this day and in modern politics, the interpretation, as well as the application of American democratic principles, continue to evolve and be debated.

Many have been fascinated by the manner in which the United States government has evolved. As you recreate an authentic geographic representation using a variety of maps, globes, aerial and satellite photographs and computer models, think about ways to insert your thoughts, opinions and ideas on how many situations were handled.

What are the characteristics of democratic government and have they changed from inception? The United State Constitution and the Declaration of Independence were established with Enlightenment ideals and old political traditions, are they still relevant and alive in our government today?

Prior to 1789, was the U.S. Constitution shaped by American events/history? In the United States government (federal, local, state, and in the three branches), how is power divided and/or shared? Are the three branches of government equally powerful and is power balanced? How have Supreme Court decisions restricted or expanded personal responsibilities and rights?

In this quest, you create an adventure in the unique environment of the Age of Enlightenment. The graphic below outlines the basic steps involved in creating your learning quest. Be aware that you may not go in order. While brainstorming, you may start doing the storyboard, then do research. While building the interface, you may have to go back and do more brainstorming. Just like a paper that you edit and revise, you will be revisiting your storyboard and your game several times to fine tune and perfect it.

On the following pages, you can read how these steps apply to designing a sample quest. Though you can design a quest by yourself, you can often generate more ideas and create more in less time if you collaborate and work as a team.

The VR Quest design screen

The 7 Steps of VR Quest®

01 Defining the Objective

An objective guides the player in your game and helps them focus on the task at hand. A good objective is clear, concise and **SMART**.

Specific
Measurable
Attainable
Realistic
Time-based

By the end of this quest, players will be able to _____.

Here is a sample **SMART** objective:

Players will be able to:

- Determine three factors that contributed to the Bill of Rights being established.
- Investigate the function of and assess the responsibilities of government in the 1700s and today.
- Compare and contrast the various types of government: monarchy, democratic, oligarchy, totalitarian, republican, fascist, parliamentary with at least two similarities and two differences of each.

Your objectives will vary depending on the type of quest you design. Your quest may have an objective that requires player participants to acquire artifacts. Or your quest could have an objective that is based on an educational gallery walk. Regardless of which one you select, an objective is necessary to guide the game designing process just as a thesis guides a major research paper. A good objective has no more than five main points.

02

Brainstorming and Collaborating

The thinking and conceptualization of process is intended to be a free-flowing period to generate as many ideas as possible. Brainstorming is the collection of all ideas. No idea is a bad idea in this stage.

Collect all ideas
Often an idea will lead to a bigger and better idea. Once you get your creative juices flowing, you start to think of other things.

Write ideas on big chart paper
If everyone takes ownership and can easily read the group work, it will generate more ideas.

Utilize pictures, colors and music
Have you ever heard the expression you are the company you keep? Writing in color will help you color code your ideas and adding drawings, photos and sketches will ignite greater creativity. This is a great organizational tool as well.

Play background music
Play some relaxing wordless music. If you have Amazon's Alexa available, she can play beach sounds, pink noise, healing or mediation sounds. You name it, she has it. Studies show that music can make you more productive.

Set a timer
A solid half-hour for brainstorming is usually sufficient time. When you work on a timer, you are focused, clear and productive. Do not allow anything to distract you during this time. Cell phones should be put away and the only task at hand will be brainstorming.

Be comfortable
Make sure you have water to drink, ample room to write and draw and the atmosphere is a pleasant temperature. When you are comfortable, you will get more done.

Now that you have completed formulating and generating ideas, you have officially completed the brainstorming process. Go through all the ideas and separate the great ideas from the rest of them. Using teamwork, read through the list and discuss what you like and dislike about each. As a group, vote on what works and what doesn't then cross off the not so good ideas. Finally, think about what you can realistically create in the given time period.

03 Research

Use the objectives you wrote in Step One to guide your research, answering any questions. Here's some of the research associated with the objectives in our example:

Assess the early events and people that contributed to the founding principles of the U.S.:

Understanding the framework of the United States is vital in order to fully comprehend our present-day basic rights and liberties. For example, there was a heavy influence of Roman and English law and people like Montesquieu, Hobbes, Beccaria, Voltaire, Thomas Paine and Locke, all who greatly affected our written documents.

- Explain what transpired in Locke vs. Hobbes.
- Define the major principals of a political system especially pertaining to law vs. politics.
- Discuss the importance of advancing public welfare, regulating the economy, providing order and protecting public safety.

Know the significance of math, science and technology:
During the Age of Enlightenment, mathematics and science were very dominant. Many forms of math were applied on a daily basis to various topics. Algebra methods were dominant and became a mathematical language that was applied across disciplines like law, statistics, architecture and even ship building. Science during this time period grew exponentially. Electricity and magnetism were further developed through studies. Chemistry became a discipline thus fostering the foundation of modern chemistry. Physics advanced significantly, as did medicine. Philosophy was introduced and natural scientific societies were promoted as scientific journals began to be published.

Explain how past circumstances and ideologies are present in the U.S. today:
Consider the role of the Enlightenment in the framework for our Constitution in terms of natural rights, social contract, separation of powers, rights of the accused and representative popular sovereignty.

How has English and Roman law influenced us?

Taking it to the next level with critical thinking:

- Reflect on how American democracy has evolved. No one, not even the president, is above the law and that holds true from the past and even to this day.
- What was the political philosophy of Declaration of Independence and how has it impacted the rest of the world?

- The Flushing Remonstrance letter was a pre-curser to Bill of Right. Discuss its significance to our rights and liberties today.
- Investigate how events like U.S. v. Nixon (1972) impeachment process, Johnson impeachment (1868), Nixon resignation (1974), Clinton impeachment (1999) and Trump (2019) impeachment in United States history are chronologically related in time to one another and explain ways in which earlier events/ideas might influence subsequent events and ideas.
- Identify and explain Constitutional Compromises like Commerce Compromise, Great Compromise, 3/5 Compromise.
- Determine the pros and cons of the Federalist Papers and the Anti-Federalist Papers.
- Discuss the impact of Declaration of Independence on America and then on the rest of the world.

VR Quest encourages scholars to practice while they are learning game creation, but do not copy. Be creative, try new things and bring new ideas and aspects into the VR experience with your fresh take and stimulating outlook.

The Constitution and the Bill of Rights gives you a wealth of opportunities and challenges to design a quest where players discover more about this time period in United States history as they think critically, and problem solve. Here are a few ideas:

- Consider the Constitutional Debate over office of the President and Executive Branch. Tell players to reshape the branches of government by evaluating evidence about events from diverse sources including but not limited to written documents, artifacts, photographs, works of art, oral traditions, charts and graphs, as well as other primary and secondary sources.
- Challenge players to create a detailed museum walk of the cultural, artistic, science and technology artifacts that is narrated by prominent historical figures of that era.
- Explore the case studies (Dredd Scott (1857), Plessy v. Ferguson (1896), Brown v. Board of Education (1954), Roe v. Wade (1973). Recreate and describe the relationship between politics, history, economics and the social climate as a context for events in the United States.

Word Wall

Apply major terms and vocabulary in your quest. Examples of vocabulary that can be applied to your storyboard.

- Statuary Law
- Federalism
- Loose Construction vs. Strict Construction
- Grand and Petit Juries
- Constitutional Limits to Freedom
- Evolution
- Conscription
- Disincentives
- Nullification Crisis
- Flushing Remonstrance Letter

Websites for Student Use

Here are a few vetted websites to help you conduct research:

https://www.the-philosophy.com/hobbes-vs-locke

https://billofrightsinstitute.org/founding-documents/bill-of-rights/

https://constitution.com/

https://www.archives.gov/founding-docs/declaration-transcript

https://www.history.com/topics/us-government/three-branches-of-government

https://www.historycrunch.com/age-of-enlightenment-overview.html#/

https://www.britannica.com/topic/history-of-Europe/The-Enlightenment

http://world-history-education-resources.com/age-of-enlightenment/enlightenment-philosophers-age.html

https://www.civilrightsmovement.com/p/woman-suffrage.html

http://www.crusadeforthevote.org/woman-suffrage-timeline-18401920

https://history.house.gov/Exhibitions-and-Publications/WIC/Historical-Essays/No-Lady/Womens-Rights/

https://www.ducksters.com/history/civil_rights/womens_suffrage.php

https://www.history.com/topics/womens-history/the-fight-for-womens-suffrage

Student Voice and Empowerment

Educators often feel as if they must know it all before they can teach it. The beauty of game design and integrating technology to support the curriculum is scholars can become the experts. There is nothing scholars love more than to be able to teach their cohorts or even adults how to do something.

Studies show that scaffolding learning helps to not only reinforce new knowledge, but to also foster and promote a growth mindset, as well as build confidence, empower scholars and reinforce a strong sense of voice.

04

Storyboard

In order to have your game make sense to the player participants, you must create your storyboard. A storyboard is a physical layout or a sequence of directions, illustrations and dialogue of the order of your story.

A good storyboard depicts significant action and changes. Think about the last good book you read. The author sat down to think about exactly what would happen when.

One of the best ways to do this is to create a series of panels that almost look like a comic book. Going through the process of planning and creating this will help you to envision both the actions that the player will be experiences, and the environments in which they'll be doing it.

Every story will have the following main components:

Introduction

Here, the player is introduced to the characters, environment and objective of the quest. You will also establish the player as the 'main character' of the story, and let them know what is expected of them.

Body

The body is where all the action takes place. Your player will face challenges, solve puzzles, meet other characters, and build toward the climax.

Climax

A climax is the ultimate challenge, where the main character uses all they've learned during the course of the quest to achieve their final objective.

Summary

The summary congratulates the player for a successful quest and reminds them of all the amazing things they did to get here.

In order to create a good story, you will need to define the challenges that the main character will face on their journey. Ideally, all of these will build upon one another getting harder and harder as the player moves forward.

As you devise your story, be sure that the problems the main character needs to solve are not too easy, but also not too hard. If they need knowledge to answer questions, be sure to embed the answers somewhere or explain clearly where they can be found.

We're going to create two sample levels to represent concepts about American Democracy. One is Women's Suffrage and the other is a Voting Simulator.

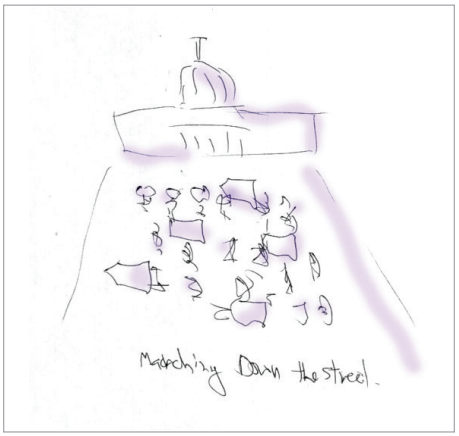
In March of 1913 thousands of women and supporters marched on Washington D.C. in protest of women not having the right to vote. It was the first mass protest for a woman's right to vote on a national scale. Thousands of women gathered in Washington and called for a constitutional amendment giving them the right to vote. Women had no say so in the laws that affected them.

Women of all races marched together down the main streets of Washington while mobs of men tried to block their path. Over 100 women were injured and the police did nothing about it. This propelled the event with great interest in the newspapers around the country, gaining attention and sympathy for the movement. The march was a turning point for women's voting rights.

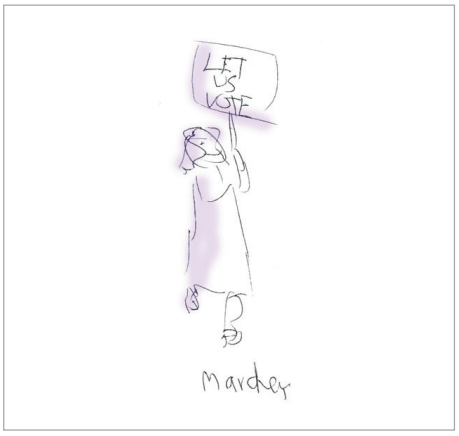
In 1920 Congress ratified the 19th amendment giving women the right to vote.

Women's Suffrage

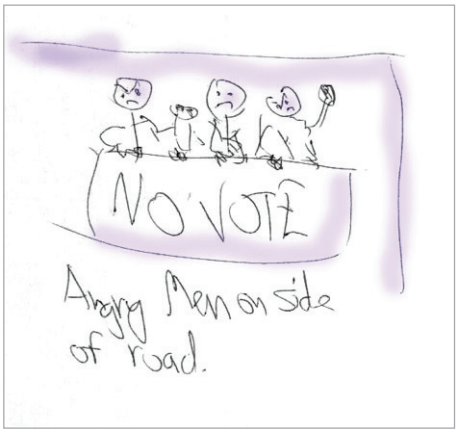
Sample Storyboard for the 1913 Women's Suffrage March



1. Women marching down the street.



2. Single marcher holding a sign.



3. Angry men along the side of the road.

4.

5.

6.

7.

8.

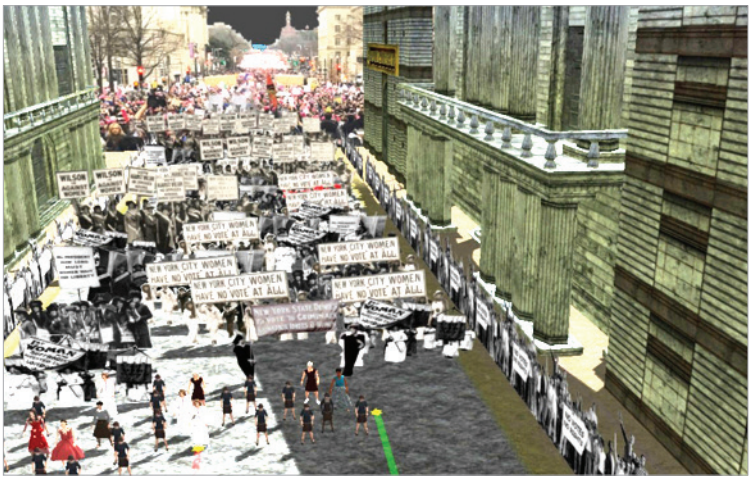
9.

05

Build the Interface

Now that you've decided your story line and main scenes, it's time to build it using the VR Quest software. Use the tables included with 'Learning the VR Quest System' to help you remember how to use the commands to build your quest.

Depending on what's available and how much time you have, you may need to go back to Steps 2-4.



06

Pilot Test

After you've finished building your first draft of the quest, you'll need to give it to people outside your team to solve. It helps to have a fresh set of eyes evaluating and making suggestions on what you need to do to improve it. This will help you to identify any problems that need fixing.

Ask the following questions of the people who try it out:

1. Did you know what you were supposed to accomplish to win the game?
2. Did everything work (switches, videos, doors, etc.)?
3. Did we provide everything you needed to succeed in this quest?
4. Was this exciting? Were you completely engaged? What do you think could make the quest better?

Professional game designers go through many pilot tests because there are almost always things that don't work the way they intend them to. Just like good writers edit and revise, as a game designer you must also seek ways to improve your game. It often helps to step away from your project and return with a fresh outlook. You may want to do several test runs.

Voting Simulator

Over the past decades, voting technology has gone from hand-marked ballots to sophisticated voting computers. Each time a new technology is introduced, there are major issues that pop up with the process. In time the kinks are worked out and a new standard of how to vote is established. We're going to create a modern example of a "Polling Place". This is a place where you go to vote.

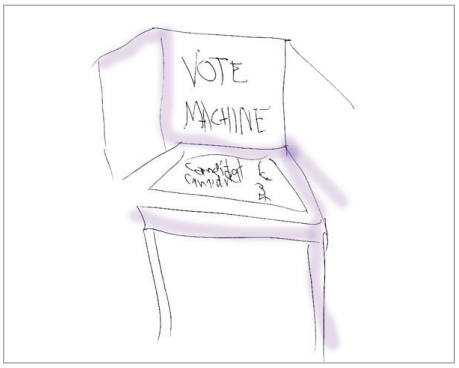
Because voting is relatively simple, this quest should be easier to create. It would be cool to have the player walk in the door of a voting place, listen to the opinion of each of the candidates, register to vote and then actually go vote.

Sample Storyboard for the Voting Simulator

1. Enter the building.

2. Listen to the candidates.

3. Register to vote.

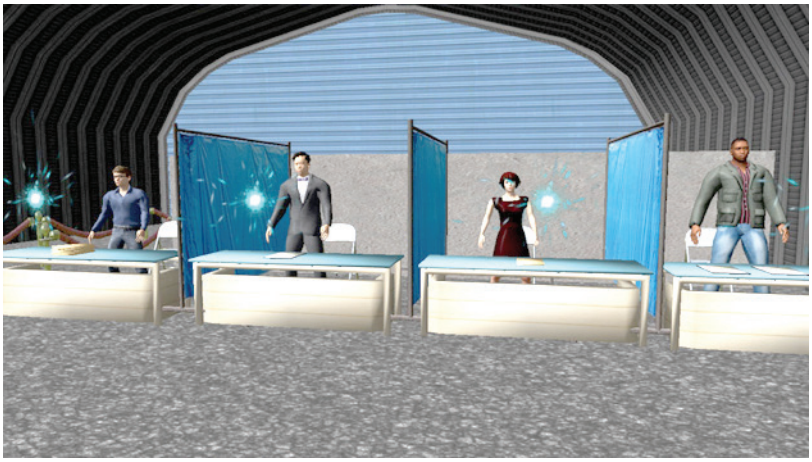


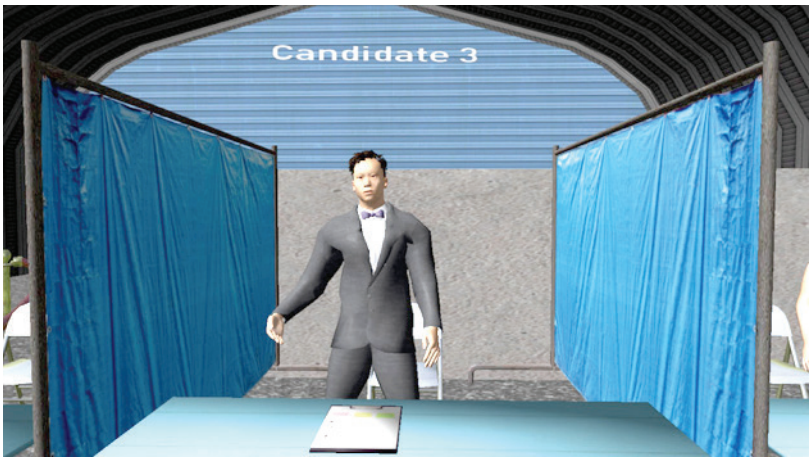
4. Cast your ballot.

5.

6.


VOTE
HERE




Candidate 3

07

Revise

The pilot test will give you lots of information. Maybe players didn't understand what they needed to succeed. Perhaps they were unable to move items or open doors to move forward. Or critical information that they needed to solve the quest wasn't available.

Following are a few of the things you may need to revise:

Factual Content:
– Did players understand the quest?
– Was all the information needed available to players?
– Did the story make sense?
– Were there things that misled players because they were unclear or inaccurate?

Interface:
– Did the interactive features work?
– Could the players navigate the landscape?
– Was the setting attractive, and in line with the theme of the quest?
– Did things like maps or guides properly match the 3-D landscape?

Overall Experience:
– Was the quest at an appropriate level of difficulty?
– Did players stay interested in the quest?
– Were players able to complete the quest in a reasonable amount of time?
– Did players have an overall positive reaction to the quest?

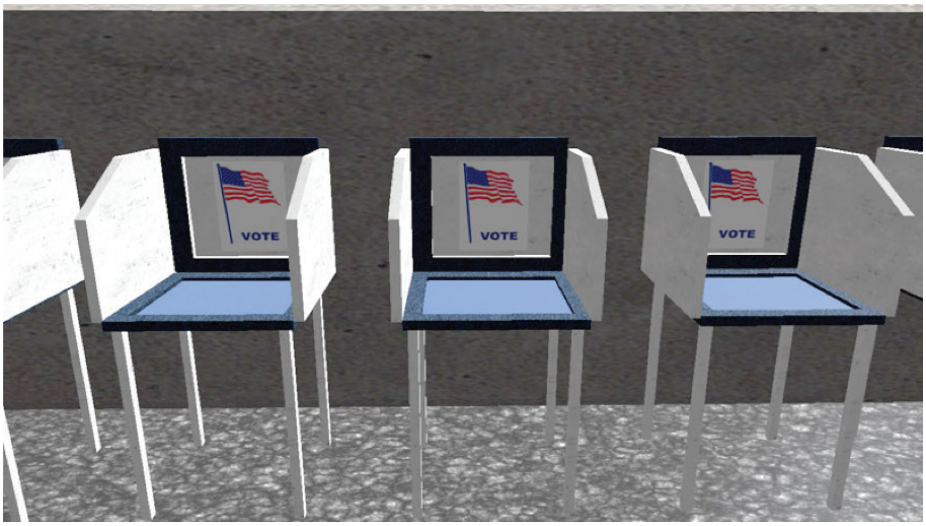
In revising, it is likely that you will repeat some of Steps 2 - 6. If you have a chance to pilot test a second time, hopefully you will see how much better your quest is after incorporating feedback.

Take It Home

One of the best things about VR Quest® is you can take your project home!

When you've finished, you will be able to save your file in a format that can play on any home computer. Your friends and family will be amazed that you've created your very own computerized VR Quest® and will enjoy playing it long after you've gone home.

In the future, we hope you'll be able to join us in designing a wide variety of quests, sparked by your creativity and imagination and share them with scholars across the United States!



Curricular Alignment

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Analyze Argument Cause/ Effect Claims Classification	W.12.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	States and verifies what is known about the problem or question and makes connections to prior knowledge. Writes questions independently based on key ideas or areas of focus.	1.A1 1.A2 IV.A1 II.A2	6c 6a 3b 4c
Comparing Contrasting Counterclaims	a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.	Analyzes and evaluates what is known, observed or experienced to form tentative thesis or hypothesis. Determines what resources will most likely offer quality information. Considers culturally divergent and opposing viewpoints on topics.	IV.A1 IV.A2 IV.A1	4d 3d
Dialogue Domain Specific Vocabulary Evidence	b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	Uses the categorization of materials within Dewey areas to locate resources and browse for additional materials.	II.A2 V.A1 I.D1	6d 3c 3c
Explanatory Text Facts	c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	Uses technology resources such as online encyclopedias, online databases, and Web subject directories to locate information on assigned curriculum topics.	III.B1 IV.B1	3b 3d

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Graphics Informational Text	d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.	Uses organizational systems and electronic search strategies - key words, subject headings) to locate appropriate resources.	IV.B4 III.B2	5c 1a
Key Details Main Topic Multimedia	e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	Uses multiple sources to acquire background information and brainstorms ideas for further inquiry.	II.B3 IV.C1	5b
Narrative Organization Pacing	f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). W.12.3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.	Questions the differences between sources and seeks additional sources to resolve. Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy. Uses both facts and opinions responsibly by identifying and verifying them. Takes notes by paraphrasing or using quotation marks when using someone else's words.	LC1 VI.B2 VI.B3	2c 5b

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Point of View Relationships Sequencing	a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events. b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters. c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).	Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy. Uses both facts and opinions responsibly by identifying and verifying them. Interprets information and ideas by defining, classifying, and inferring.	II.B2 III.B2 I.B3	4c 6d
Visual Information	d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters. e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	Uses common organizational patterns to organize information in order to draw conclusions. Forms opinions and judgments backed up by supporting evidence. Publishes a final product for a particular audience and purpose. Interprets information and ideas by defining, classifying, and inferring. Considers culturally divergent and opposing viewpoints on topics.	VI.C1	3b

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Audience	f. Adapt voice, awareness of audience, and use of language to accommodate a variety of cultural contexts. W.12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. W.12.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	Uses common organizational patterns to organize information in order to draw conclusions. Cites all sources used according to local style formats. Publishes a final product for a particular audience and purpose. Uses interactive multimedia tools to exchange data collected and to learn curricular concepts by communicating with peers, experts and other audiences. Determines what resources will most likely offer quality information.	VI.C2	5c
Organization	W.12.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. a. Explore topics dealing with different cultures and world viewpoints.	Evaluates quality of electronic and print information for usefulness, currency, authority, and accuracy. Uses technology resources such as online encyclopedias, online databases, web subject directories to locate information on assigned topics in the curriculum.	III.B1	5b

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Purpose	a. Explore topics dealing with different cultures and world viewpoints.	Forms opinions and judgments backed up by supporting evidence. States and verifies what is known about the problem or question and makes connections to prior knowledge.	II.B3	5c
Analyzing Claims Comparing Contrasting Evaluating	W.12.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	Writes questions independently based on key ideas or areas of focus. Analyzes and evaluates what is known, observed, experienced to form tentative thesis or hypothesis. Uses organizational systems and electronic search strategies (keywords, subject headings) to locate appropriate resources.	I.C3 I.D1 IV.D1 II.D1	7a 6b 4d 6b
Evidence Informational Texts Questioning Reasoning	W.12.11 Create interpretive and responsive texts to demonstrate knowledge and a sophisticated understanding of the connections between life and the literary work. a. Engage in using a wide range of prewriting strategies, such as visual representations and the creation of factual and interpretive questions, to express personal, social and cultural connections and insights.	Uses table of contents, index, chapter and section headings, topic sentences and summary sentences to locate information and select main ideas. Uses the structure and navigation tools of a Website to find the most relevant information.	IV.D1 I.D1 I.D4 VI.D1	3a 1a 3b 3a

DOK Tags	Common Core	IFC Standards	AASL	ISTE
Quotation Audience Purpose	b. Identify, analyze, and use elements and techniques of various genres of literature, such as allegory, stream of consciousness, irony, and ambiguity, to affect meaning. c. Develop innovative perspectives on texts, including historical, cultural, sociological, and psychological contexts. d. Create poetry, stories, plays, and other literary forms (e.g. videos, art-work.	Uses both facts and opinions responsibly by identifying and verifying them. Takes notes by paraphrasing or using quotation marks when using someone else's words. Evaluates and paraphrases information that answers research questions. Cites all sources used according to local style formats.	III.A1 V.D3 IV.D2	3a 5b