Distance Learning In Support of Rock Creek Park

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Abstract

One mission of the National Park Service (NPS) is to educate the next generation of national park supporters; however, not every elementary schooler is able to visit a national park. The NPS plans to expand their outreach through distance learning. The project goal was to assist Rock Creek Park and Friends of Peirce Mill with their distance learning initiative by assessing the distance learning technologies used by other national parks, developing interactive virtual lessons about Peirce Mill for third grade students, and creating training materials for the park and partners. Interviews with educators from national parks and other organizations revealed trends in techniques and technologies used in their distance learning programs. A recommendation was made to Rock Creek Park about how to develop and conduct distance learning programs.

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The Distance Learning Initiative by National Parks

Since 1916, the National Park Service (NPS) has maintained the nation's natural and cultural resources, as well as preserved the parks for the enjoyment of future generations. The NPS was established on August 25, 1916 when President Woodrow Wilson signed the Organic Act. The mission of this act is, "... to conserve the scenery and the natural and historic objects and the wild life therein and … leave them unimpaired for the enjoyment of future generations."[1] Today, there are over 400 national park service sites across the United States, the American Samoa, Guam, Saipan, Puerto Rico, and the Virgin Island (see figure 1). The NPS employs about 20,000 individuals with a passion for the parks, and over 318 million people visit the parks every year.[2] Although parks have spread across the nation, the responsibilities of the NPS have not wavered since their opening in 1916.

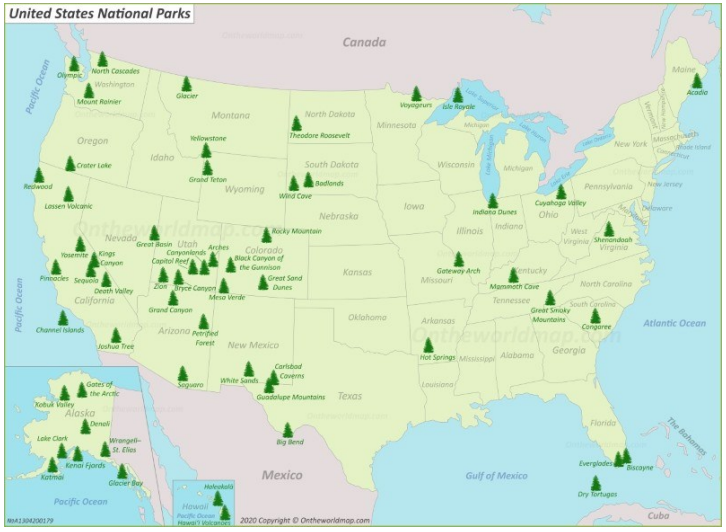


Figure 1: A map showing the national parks located across the United States.[3]

An additional responsibility of the NPS includes educating the public about the parks. Each park has its own educational mission, such as history, culture, or nature. With time, the parks developed educational activities for students of all ages to learn about the history and culture held by the parks. The NPS wants every fourth-grade student to visit a national park to build the next generation of park supporters.[4] By implementing different teaching styles and techniques, the NPS has successfully provided an engaging and meaningful experience for visitors of every age.

The National Park Service cares about student learning as seen by their extensive educational program, and they want to expand their outreach through distance learning. Not every school district is located close enough to a national park to take an in-person field trip, and some schools also do not have the funding to make field trips. A distance learning program is a method to reach these students, as well as increase in person attendance at the parks. If students enjoy a virtual field trip to the park, parents and teachers may be more likely to schedule an in-person field trip.

The project goal is to assist Rock Creek Park with their distance learning initiative by assessing the distance learning technology currently in use by other national parks, developing interactive virtual lessons about Peirce Mill for 3rd grade students, and creating a staff tip sheet for the park and partners. The team researched potential platforms and determined which learning platform best fits the needs of park staff to teach the elementary school level curriculum at Rock Creek Park.

Virtual Field Trips: Bringing National Parks to Remote Students

Rock Creek Park, the project sponsor, is a national park located in Washington, D.C., that focuses on the history of Peirce Mill, environmental education, and astronomy at their planetarium.[6] Peirce Mill is the last functional grist mill in Washington, D.C., so many D.C. public schools take a field trip to Rock Creek Park to fulfill their local history curriculum standard in the third grade. Rock Creek Park wants to expand their distance learning options to reach a wider audience of elementary school students.

> "There is nothing so American as our national parks.... The fundamental idea behind the parks...is that the country belongs to the people, that it is in process of making for the enrichment of the lives of all of us."[5]
>
> **- President Franklin D. Roosevelt**

National Park Service

The National Park Service protects natural ecosystems, preserves historical and cultural sites, and educates students on the value of the parks. National parks, in both the United States and throughout the world, are formed to protect and conserve local wildlife and sites of natural beauty. They support a healthy, diverse, and resilient environment. These protected core areas can even help mitigate the impacts of natural disasters such as floods, landslides, and avalanches by keeping the soil stabilized. As long as national parks exist, breathtaking locations such as the Grand Canyon will be preserved for future generations.

The National Park Service also preserves cultural values by protecting historical landmarks and sites. Although many national parks in the United States aim to serve and protect a natural wonder, many serve to honor historical landmarks. These parks educate the public about major historical events. By preserving, dedicating, and restoring historical sites, the National Park Service provides an invaluable learning experience. People from across the globe are able to tour famous landmarks that otherwise may have been destroyed or lost through time.[1]

The National Parks educate the public on the environmental and historical value of the parks. Part of the National Park Service's mission statement is to educate future generations, and they have a goal that every fourth-grade student should visit a national park. The National Park Service accomplishes this goal through offering educational programs on a variety of topics, such as history and culture, nature, and outerspace.[4] Each national park has their specific focus and mission regarding what they preserve and educate the general public about.

Rock Creek Park

Rock Creek Park's main mission is educational outreach. They complete this mission through a variety of programs and field trip opportunities. At the elementary school level, Rock Creek Park educates students about the environment, astronomy at the planetarium, and the history of Peirce Mill and Washington, D.C.[6]

Rock Creek Park is known for Peirce Mill, the last operational mill on Rock Creek (shown in figure 2). Peirce Mill was built by Isaac Peirce in 1829 and used water as a power source to grind corn, wheat, and rye. The mill ran until 1897 when the shaft broke. In 1933, Peirce Mill and Rock Creek Park were transferred to the NPS, who restored the mill and grounds over the course of three years.[7] Now, Rock Creek Park offers a variety of programs to teach elementary school students about Peirce Mill (shown in figure 3).

The Rock Creek Park educational department has designed their programs with the educational requirements of D.C., Maryland, and Virginia in mind. They use Common Core and Next Generation Science Standards to ensure that teachers can fit their programs into lesson plans, and they update these standards annually. Pre and post lesson activities are also provided to create a complete learning experience and make a visit to Rock Creek Park more than just a field trip.[8]

Figure 2: Peirce Mill[7]

ROCK CREEK PARK EDUCATIONAL PROGRAMS

Rock Creek Park's educational programs are aligned with the educational requirements of DC, Maryland, and Virginia. They use Common Core and Next Generation Science Standards to ensure that teachers can fit their programs into lesson plans, and they update these standards annually. Pre and post lesson activities are also provided to create a complete learning experience and make a visit to Rock Creek Park more than just a field trip.

FARM FIELDS TO MILL WHEELS: A PROGRAM FOR YOUNG MILLERS

Is there cornmeal in your kitchen cupboard? Where did it come from? Two hundred years ago, flour and meal came from the local mill. In this hands-on program, children will learn how farmers once grew corn, and how millers turned that corn into cornmeal. They'll also try grinding grain by hand, then see how a water-powered mill makes this job much easier!

GEARS AND GRAINS: ENGINEERING A GRIST MILL

Discover how an historic grist mill works, and maybe be inspired to invent the machines of the future! This STEM-focused program uses hands-on demonstrations to explore engineering at Peirce Mill. See a 19th-century mechanical marvel in action, and learn how waterwheels, wooden gears and pulleys work together to grind corn into corn meal.

WASHINGTON AS IT WAS: A D.C. HISTORY PROGRAM

Travel back 200 years to Washington's past, without leaving the city! At Peirce Mill, students can imagine a time when local farmers brought wagon-loads of corn to be milled along Rock Creek. They'll study maps of the city then and now, and try different milling techniques themselves. They'll learn about the economics of milling, and discover why there were once so many mills in Washington, DC.

Figure 3: An infographic showing the educational programs currently offered at Rock Creek Park.[6]

Distance Learning

Rock Creek Park, and the National Park Service as a whole, desires to expand their current educational outreach through distance learning. Rock Creek Park specifically wants distance learning at the elementary level, which requires understanding of teaching and distance learning techniques, as well as distance learning technology platforms.

Distance Learning Techniques

Distance learning is defined as "a method of study where teachers and students do not meet in a classroom but use the Internet, e-mail, mail, etc., to have classes"[9]. The development of any lesson plan requires a deep understanding of the modern science of learning and development. This science is composed of emerging classroom practices and techniques utilized by school instructors to educate their students effectively. These general teaching practices can be used as a guide when designing lessons to be delivered remotely.

When creating a lesson plan, it is important to define lesson objectives, assess current understanding, introduce content, assign an activity, and assess mastery.[10] One example of a teaching guide that satisfies these requirements and can be adapted for remote learning purposes is the "Four Aces of Effective Teaching." This conceptual framework was designed by professors from three different universities to be used for increased "... self-reflective practice among teachers in higher education settings." The four aces of effective teaching include Outcomes, Clarity, Engagement, and Enthusiasm (defined in figure 4).[11]

While these four aces are primarily designed for higher education, their broad nature makes them applicable to lesson plans of any grade level. In addition, because these aces are conceptual, they can be applied to both in-class and online learning educational environments.[11] Outcomes and clarity, while important for higher education, serve a different purpose for elementary education. Young students may not have an interest in long term plans for learning, but they do benefit from a distinct routine followed in each lesson and a clear understanding of the goal of their activities.

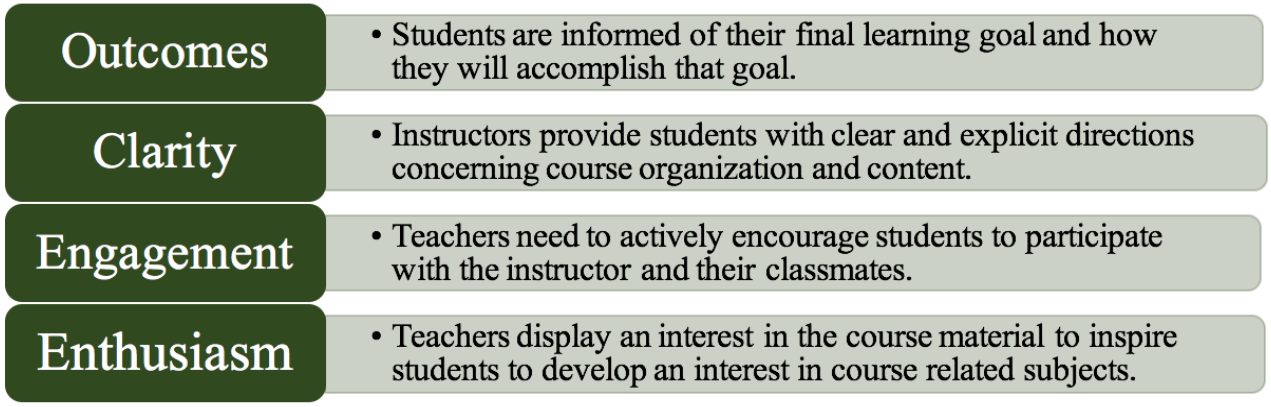


Figure 4: The Four Aces of Effective Teaching. [11]

Engagement and enthusiasm are critical in distance learning with elementary schoolers, and such experiences help to prevent feelings of isolation. Researchers studying students' attitudes during distance learning at Deakin University identified three main issues with distance learning: a sense of isolation, negative or indifferent attitudes of staff, and students' abilities with learning technologies.[12] In a study performed at the Open University in Scotland, researchers found that one aspect typically missing from remote learning is the connection that students build with their peers, leading to feelings of isolation.[13] By utilizing the principles of engagement and enthusiasm, students will engage with each other and build connections that decrease feelings of isolation and improve the overall distance learning experience.

Distance learning has a long history, and popular methods have changed over time with developments of new technologies. Anderson splits distance learning into three categories, defined by their pedagogy and available technology. The first type is one sided, with a teacher presenting a concept and students demonstrating that they understand. The next is interaction between students and development of new knowledge based on previous learning with the use of two-way communication technologies, where the teacher steps back to provide the structure for learning activities. The third distance learning pedagogy heavily relies on technology to build a system of information, resources, and contacts that can be applied to real problems.[14]

These distance learning pedagogies can be applied to synchronous lectures, as well as encourage students to go through class material on their own time. There are also multiple approaches to utilizing distance learning technologies. Fedina determined two main approaches for using distance education technologies:

- Online method: Two-way communication and online streaming.
- Offline method: Video and educational resources are posted on education portals.[15]

Considering which delivery mode to use—asynchronous, synchronous, or a hybrid model—depends on the needs of students. Asynchronous options allow for students to participate in programs on their own schedule. However, they do not foster personal connections between students and teachers, unlike synchronous options. For these reasons, hybrid models are often preferred because they offer both the flexibility of the asynchronous model, as well as the connections of the synchronous model.

Distance Learning Platforms

There is an abundance of resources to use when considering distance learning. Videoconferencing programs such as Skype, Teams, and Zoom provide face-to-face interaction over the Internet. Applications such as Duolingo, Khan Academy, and YouTube can promote self-learning and guidance. There are also applications such as Kahoot and Quizlet which promote education through competition in trivia games. Zoom, in particular, gained rapid popularity for videoconferencing during the coronavirus pandemic. The software's free plans allow up to 100 participants and 40-minute calls with three or more participants.[16] Teachers find the program's features, such as group and private chat, breakout rooms, and screen sharing, helpful to encourage peer interaction. Its interface and features are utilized with ease by consumers who are not experienced with video conferencing software.

Distance Learning Programs by Other National Parks

National Parks are currently using a variety of distance learning technologies and methods to bring their curriculum to students. A distance learning program at Grand Canyon National Park can be seen in figure 5. The distance learning initiative for national parks creates opportunities for students to learn regardless of their location and school's budget. Some of these technologies include video conferencing, pre-recorded videos, and worksheets. The variety of technologies available allow teachers to make decisions on what is best for their classroom and students. One common element seen across multiple national parks is a lesson plan for their programs. The lesson plan includes an objective, curriculum covered by the program, pre- and post-visit activities, and instructions to execute the lesson. These lesson plans provide clear learning outcomes and clarity about the overarching organization of the program.

Figure 5: A distance learning program in progress at Grand Canyon National Park.[17]

Synchronous Activities

Live video conferencing fulfills the need for student engagement and enthusiasm required in an effective distance learning lesson plan. Many national parks, such as Glacier National Park and Grand Canyon National Park, offer live programs via a video conferencing platform. Common platforms used by national parks include Microsoft Teams, Google Meet, Skype, and Zoom. The "Ask a Ranger" program is found at many parks. During the Grand Canyon's edition of this program, the ranger gives a short presentation about the park and then answers students' questions about nature, the history of the park, and what it is like being a park ranger.[17] The video conferencing program is a great way to connect students to park rangers without the need to travel to a national park. These programs provide students with the opportunity to participate with their instructor and their classmates while in a distance learning environment.

In addition to the "Ask a Ranger" program, national parks offer other video conferencing programs. Yellowstone National Park has a "Mystery Skype" program where students solve a geography problem to figure out where the ranger works.[18] Grand Canyon National Park runs programs such as The Human Story and Ancient Life, where students learn about the history of the park through archeology and paleontology, respectively. These programs include lesson plans, a list of the national standards met by the program, and cards to complete an activity.[17]

Asynchronous Activities

Asynchronous activities provide another option for students where synchronous activities are not ideal. Not every school has access to the technology to video conference with a ranger; these schools can benefit from asynchronous activities. Many national parks have pre-recorded videos on their distance learning websites. Channel Islands National Park has live archived programs on their website to teach students about the islands and surrounding waters.[19] These videos and those provided by other national parks allow students to learn about the park visually without the need to schedule a synchronous session.

Yellowstone has worksheets on topics that complement their videos, so teachers can use both options to reinforce concepts in multiple ways. These worksheets are an asynchronous version of distance learning; teachers can work them into their curriculum without the need to allow for an hour of video conferencing.[18] In conjunction with pre-recorded videos, worksheets fulfill the need for clear learning goals and explicit directions concerning course organization required to formulate a successful lesson plan.

Project Description

The project goal is to assist Rock Creek Park with their distance learning initiative by assessing the distance learning technology currently in use by other national parks, developing interactive virtual lessons about Peirce Mill for 3rd grade students, and creating a staff tip sheet for the park and partners. The project will include the following deliverables (shown in figure 6):

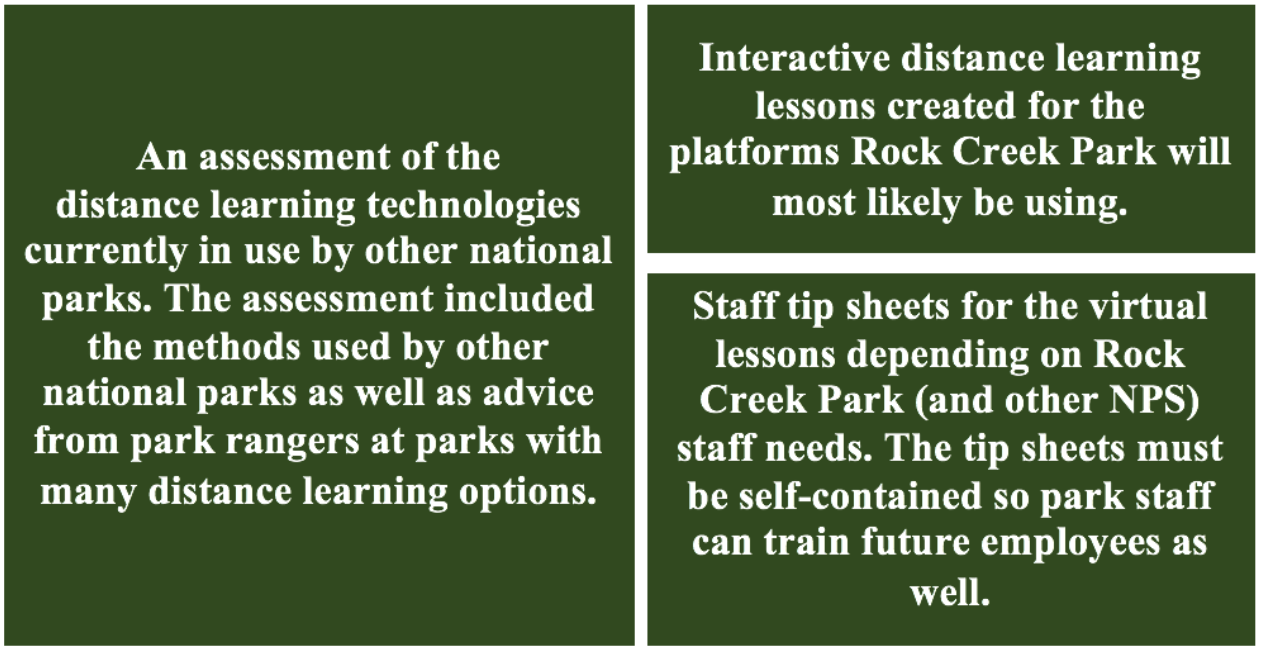


Figure 6: Project deliverables.

Researching Distance Learning Technologies and Creating Activities

This section explains how information was gathered, analyzed, and applied to various aspects of the project. These aspects include: researching distance learning technologies, choosing a platform that best fits Rock Creek Park's curriculum, developing lessons for chosen platforms, and developing training for park staff to use lessons on the chosen platforms. Platforms were broken into three categories: video conferencing platforms (such as Microsoft Teams), lesson development platforms (such as Microsoft PowerPoint), and video editing software (such as Adobe Premiere). First, park staff and teachers familiar with 3rd grade level education were interviewed to collect a list of common distance learning platforms and criteria that park staff and teachers deem necessary in these platforms. Four video conferencing platforms, four content development platforms, and two video editing platforms were considered. This information was used to create both an assessment and a recommendation of distance learning platforms for Rock Creek Park. Next, interactive virtual lessons based on Rock Creek Park's current curriculum were developed using these platforms. After the lessons were developed, a training program for the park and partners on how to use the virtual programs was created. Figure 7 is a flowchart showing the order of completion for tasks in the methodology.

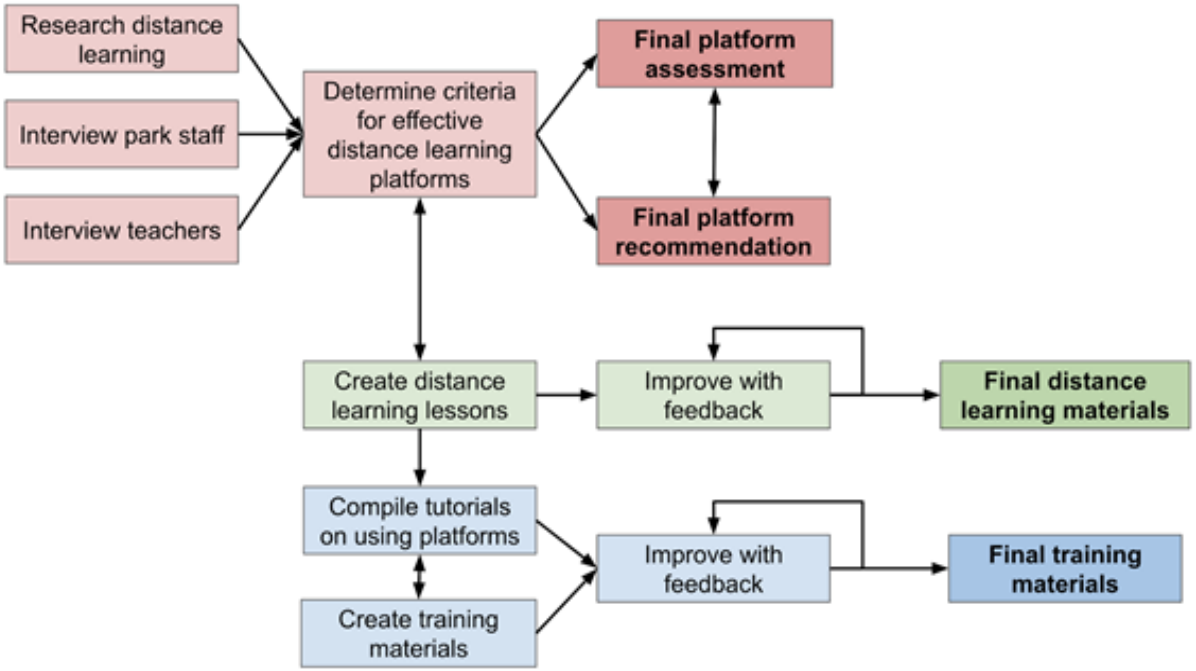


Figure 7: Methodology flowchart. This flowchart shows the tasks that were completed in the project in the order in which they were completed. It illustrates which tasks needed to be completed in which order, and which tasks could be completed simultaneously.

Phase 1: Assess Distance Learning in National Parks and Schools

Before designing remote learning options for Rock Creek Park, the team researched distance learning platforms currently in use by other NPS sites, and provided Rock Creek Park with an assessment and recommendation. This information was collected through researching scholarly articles about distance learning techniques, reviewing NPS websites, interviewing educational staff leaders at parks with a strong distance learning presence, and researching specific platforms.

First, the team researched distance learning techniques and platforms. This information was found using peer reviewed journal articles and authoritative websites about distance learning techniques for the elementary age, as well as the education section of NPS websites. Results from the research about distance learning techniques provided guidelines on how primary school children best receive information. After researching distance learning techniques, a more focused approach was taken by looking at the distance learning platforms used at specifically chosen national parks. The national parks to be researched were chosen based partially on a list of national parks with strong distance learning initiatives provided by the sponsor at Rock Creek Park.

Additional parks were chosen by using the "Educator Resources" section of the NPS website, where the search for educational programs was filtered to distance learning programs.[20] The chosen parks were entered into a spreadsheet that contains each park's primary educational mission, which platforms they use, and the types of lessons (e.g., video conferencing, pre-recorded videos, worksheets). Collecting data in this format allowed us to find patterns in terms of the platforms used for programs that target similar age ranges or at parks that have similar educational missions. This data helped us generate interview questions specific to the distance learning programs at each park.

The next part of this phase was interviewing park rangers and teachers to gather their insights about distance learning (shown in figure 8). The team contacted national parks with strong distance learning programs and interviewed their chief of interpretation. From these interviews, a list of common distance learning platforms was generated. Interviewees were asked which features (e.g., hand raise, breakout rooms) they found to be most important in a platform, as well as the relative importance of these features compared to each other. Next, interviews were conducted with elementary school teachers in the D.C. public school district about necessary criteria for distance learning platforms and remote teaching. The results of these interviews were used to expand the list of criteria and solidify the weightings. Teachers will be the ones assisting their students during these distance learning experiences, so their insight is invaluable. Finding options that work for the students, park rangers, and teachers is a necessity as is fitting the programs developed and presented into the learning objectives of the established curriculum.

Once the list of platforms and criteria was created, an assessment of the distance learning platforms was developed and a recommendation, based on input from park rangers and teachers, was made to Rock Creek Park. The assessment was a summary of each platform and their benefits and drawbacks. Further research was performed about specific platforms that are used in many parks and have a high satisfaction rating from the parks' educational staff. The team's recommendations consist of platforms that fit the needs of Rock Creek Park. With the benefits of various distance learning platforms considered, the next phase of the project began with the creation of lesson plans.

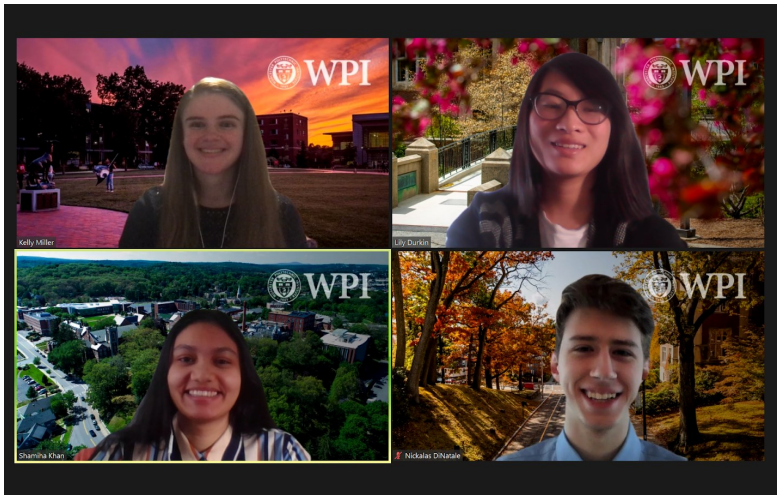


Figure 8: The team conducted interviews with educators from national parks over zoom.

Phase 2: Design Lesson Plans

With technological platforms for lessons selected, the team began adapting the given curriculum into lesson plans designed using Rock Creek Park's unique curriculum focus, putting emphasis on Peirce Mill's social, technological, and cultural importance. The first step in creating these lessons was adapting and recreating Rock Creek Park's current lessons for a virtual environment. Rock Creek Park already had a remote learning foundation in the form of online material. This foundation included activities for before or after a field trip to Rock Creek Park, and was used to begin creating distance learning materials. The material is currently in the form of a printable PDF; however, educators at Rock Creek Park desired to update the material to an interactive virtual format so that students do not need to have access to printing. This online material was adapted from its current format into one that can be utilized with the technological platforms suggested by Rock Creek Park and D.C. public school educators. Once Rock Creek Park's current teaching material had been adapted, the team reviewed it and received feedback from the sponsor. This step ensured that none of the central focus of Rock Creek Park's current material was lost in the transition to a new technological platform.

In tandem with the conversion and revision of Rock Creek Park's current material, the team designed individual lessons inspired by distance learning materials of other National Parks. The team also consulted with teachers during the creation of these lessons to utilize their expertise in the field. While the specific material of other national parks is different from that of Rock Creek Park, the format, techniques, and

technologies they use to deliver individual lessons is adaptable. While the specific material of other national parks is different from that of Rock Creek Park, the format, techniques, and technologies they use to deliver individual lessons is adaptable. This means it is possible to adapt, revise, or combine the distance learning lessons of other national parks to be utilized by Rock Creek Park. Specifically, the team selected relevant lessons and activities used by other parks and modified them for use with the recommended technological platform and curriculum materials Rock Creek Park provided. Interviews with park rangers, teachers, and educators from various institutions working with elementary school students via distance learning helped the team to define the criteria for determining the effectiveness of the lesson plans as well.

Phase 3: Create a Training Program for Park Staff

Following the completion of distance learning lessons for Rock Creek Park, tip sheets on using the lessons and chosen platforms were created. The longevity and clarity of these materials were prioritized so that Rock Creek Park staff can use them to train future staff members. Feedback from Rock Creek Park staff was utilized to improve the training materials.

There were multiple options for the format of lesson and platform training materials. The training material format was chosen based on the needs of Rock Creek Park staff. Two options considered included:

- Manuals or tip sheets on how to use the platforms for the lesson plans, with written explanations, relevant screenshots, and diagrams.
- Slideshows on how to implement the lessons with the chosen platforms for distance learning with clear explanations, screenshots, and diagrams of the platform.

The team decided the best training option was a collection of tip sheets for the various platforms. These tip sheets are easy to update as Rock Creek Park updates their distance learning programs.

Figure 9: A ranger running a distance learning program at Acadia National Park. [21]

Distance Learning Program Best Practices

Over the course of the interviews with National Parks and other institutions, the types of distance learning programs and good practices for running them were recorded. A platform assessment was created from interviewee responses, regarding what video conferencing and other software was used for distance learning programs. A lesson plan and lessons for Rock Creek Park were created with the responses from interviewees and literature review of educational practices in mind. A set of interviews with teachers revealed the expectations teachers have for park rangers, and what they are looking for in field trips.

Types of Distance Learning Programs Run by National Parks

Through interviews with National Park educators, a variety of video conferencing distance learning program types were found to be used. Most of the programs offered are synchronous and designed for a classroom of students. For presentations, many parks use PowerPoints that include many images and video clips. Most distance learning programs consist of a presentation followed by a Q&A session. Multiple parks host “Ask a Ranger” programs, where students can ask rangers specific questions about their role and about the park.

Good Practices for Distance Learning Programs

Each individual national park has a unique educational mission in addition to NPS's overall mission to protect and preserve the parks for future generations to enjoy. Different parks' missions range thematically from geology, nature, and science to history and culture. The educational staff accomplish their mission by creating field trip programs for local schools. In order to reach beyond local schools, the parks are expanding into distance learning. The educational staff at each park have developed their own individual programs; some have been working on their programs for many years, while others began their programs in the spring of 2020. The educational staff are now eager to collaborate across parks and develop stronger programs based on advice from other rangers. Through interviews with the educational staff at twenty parks, the team has compiled the following findings.

Programs Must Fulfill the Needs of Teachers

The most prominent piece of advice provided by NPS educational staff interviewees was to offer programs tailored to the needs of teachers. Whether that be through filling a Next Generation Science Standard or another Common Core standard, or by working with the teacher individually to add onto or enhance a topic covered during their class, it is important that the lessons offered extend beyond being just a stand-alone, fun field trip.

Many national park educators develop their distance learning lessons such that they fit the curriculum of local schools (see figure 10). Educators at seven of the twenty parks specifically mentioned that they are following the Next Generation Science Standards, which are in use by over forty states across the country. Educators at thirteen parks followed their state's specific standards. In addition to specific curriculum standards, many educators tailor their programs to learning goals for specific grade levels. For example, programs at Gettysburg National Military Park cover the fourth-grade local history curriculum, as well as the fifth and eighth grade Civil War curriculum. Dinosaur National Park programs focus on the dinosaur piece of curriculum found in second and fourth grade standards.

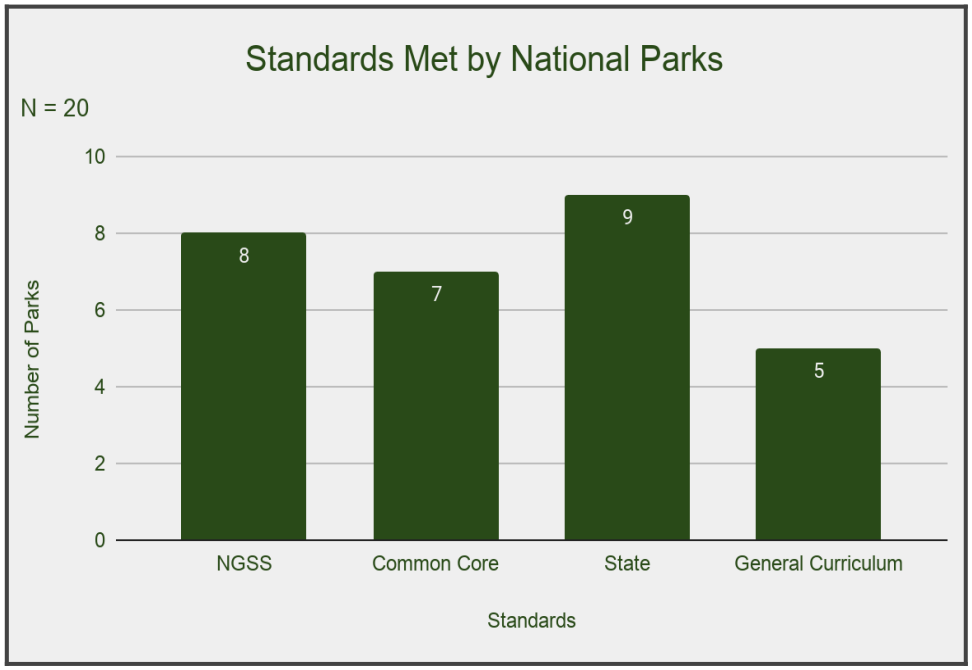


Figure 10: A bar chart showing how many national parks currently meet each type of curriculum standards for elementary schoolers.

The educators at many parks (15/20) use video conferencing platforms currently in use by the schools with which they are partnering. Some park rangers act as a guest presenter and rely on teachers to host the meeting and run the class as usual. Although most park rangers request co-host abilities for the meetings, they all ask that teachers manage the class. The teachers are tasked with muting the group, calling on kids to participate, and undertaking any needed disciplinary action. This collaboration makes the program easier on the ranger because the teacher knows their class well, and can make sure all students get an equal chance to participate.

The educators at national parks rely heavily on informal teacher feedback to gain an understanding of the effectiveness of their distance learning programs because National Park Service employees cannot conduct formal surveys without administrative approval. The park staff use this feedback to improve their programs over time, creating strong lessons that fit the mold of what the schools need. Some park rangers even hold professional development programs with teachers where rangers discuss incorporating national park education into teachers' lesson plans.

Programs Must be Engaging and Interactive

Engagement and interaction are critical in distance learning programs with elementary schoolers as they prevent feelings of isolation. When students are allowed to engage with the presenter or their fellow students, they are able to build connections that decrease the feelings of isolation associated with a remote learning environment. In addition, engagement between the presenter and students helps mitigate the fatigue that occurs in students during lengthy video conferencing programs. As this fatigue increases, it becomes more difficult for students to retain information. When dealing with elementary students, this fatigue is only accentuated as younger children have shorter attention spans than the average adult. For this reason, it is important to analyze the methods national parks are utilizing to promote engagement and interactivity in their distance learning programs.

Although the rangers interviewed are at parks across the nation, their definition of engagement remained consistent. These elements include the use of props, physical movement, and question and answer activities. Props can range anywhere from costumes, show and tell objects, pictures, and even signs. Physical objects keep kids engaged by changing the pace from a normal oral presentation. For example, the educators at Grand Canyon National Park utilize physical rocks that originate from the Grand Canyon and that they can display to their webcam as a backup to their geology slides. Rangers from Acadia National Park included signs in their presentations with phrases like "what's your opinion?" to encourage kids to speak up.

Another consistent element of engagement is the use of physical movement for students. Most educators at parks realize kids are unable to sit still for long durations of time, and are creating unique ways to help. Educators at Acadia National Park include dance breaks that allow kids to move around their chair at predetermined break times. Educators at Joshua Tree National Park host "Landform Yoga" where kids are able to pose as different geographical landforms while learning about the different landforms. Educators at many other parks encourage movement in simple ways such as "Simon Says" games.

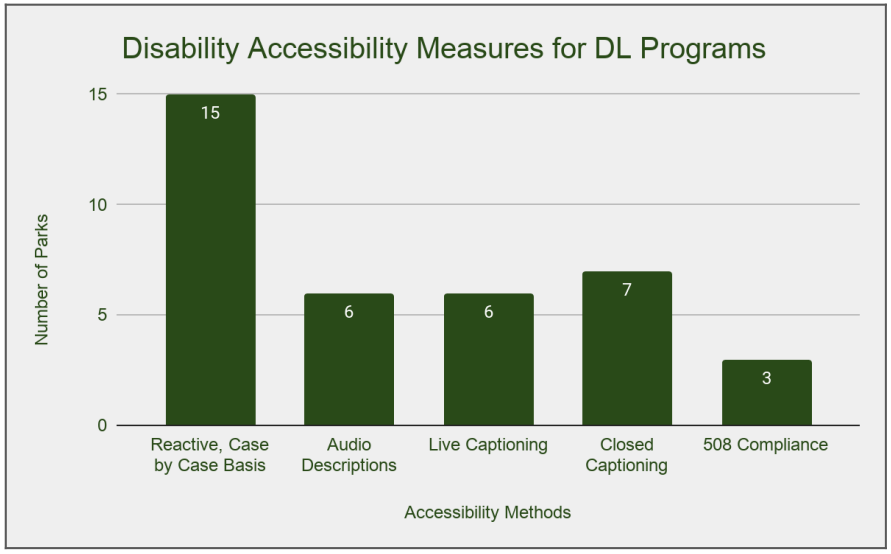


Figure 11: A bar chart showing how many national parks currently have accessibility accommodations in place for their distance learning programs

In addition, a "Question and Answer" approach, where kids use their critical thinking skills is also widely considered an element of engagement. Many park rangers will host a "Q&A" session at the end of their programs, where informal feedback on the program is collected as well as permitting a determination of how well the kids absorbed the material presented in the program. The educators at Channel Island National Park have different levels of questioning, starting with "what is this?" They embed rhetorical questions throughout the program to check for comprehension and increase interactivity. They also utilize the chat feature so that every student, even those at the elementary level, gets the opportunity to answer the questions. The educators at Homestead National Park also utilize questions, and they prefer that every student remain off mute for the duration of the program so that they can react and answer questions.

Parks Must Provide Disability Accommodations

The National Park service is obligated to provide accommodations to students with disabilities. First and foremost, each park ranger stated that they work with the teachers to fit the needs of students for each individual program. Some typical standard accommodations provided are audio description, closed captioning, and 508 compliant materials. The number of parks that use each of these accommodations can be found in figure 11. 508 compliance refers to making sure worksheets, documents, and other online materials are accessible to students with disabilities. Acadia National Park has a strong distance learning program that encompasses many accessibility features. They prefer to host on Google Meets, which has closed captioning.

Their videos are also captioned and audio described, and their worksheets are 508 compliant. Beyond the typical accommodations, the park educators work one on one with the teachers who know the students in their class the best and can provide advice for making the program accessible.

For some parks such as Gettysburg, distance learning programs are actually more accessible than in-person programs. Gettysburg's in-person program involves a long walk on rough terrain, so a distance learning program is more accessible to students with physical disabilities.

The NPS Needs a Standard Assessment Tool

National Parks throughout the country were consistent in their use of at least some form of lesson assessment during distance learning programs (see figure 12). However, most park rangers relied on informal assessment as opposed to formal assessment due to federal restrictions on the usage of surveys. Every park ranger interviewed relied on some sort of anecdotal feedback from teachers. Usually, this anecdotal feedback would be received verbally by park staff at the end of a synchronous program or by written email after the program's completion. In addition, most of the national park staff gauge lesson effectiveness by their perceived engagement of students during the actual program. If students were physically displaying interest during the video conference or were actively participating in discussions, then park staff would conclude the lesson was effective. Ultimately, the primary method park staff used to determine whether a distance learning program was effective was via teachers requesting programs for their classes year after year.

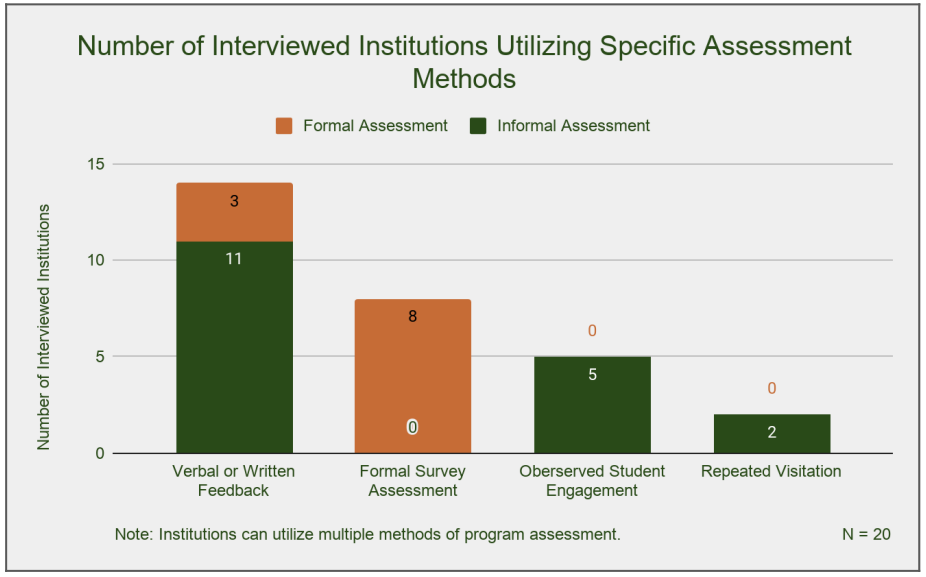


Figure 12: Number of Institutions Utilizing Specific Assessment Methods. A bar chart showing the number of interviewed institutions utilizing specific assessment methods. Institutions can use more than one assessment method.

Federal Regulations Limit Technology Use

As an agency of the federal government of the United States, the National Park Service is expected to uphold federal regulations and procedures when it comes to technology utilization and program assessment. From interviews with national park educators throughout the country, it was discovered that these federal regulations and procedures require approval to utilize new technological platforms in distance learning programs. Any and all software used by a national park within the National Park Service must meet the data security and privacy standards of the Department of the Interior. If a National Park employee wishes to utilize new software during any of their programs, remote or otherwise, they must first submit a formal request for software evaluation to the Department of the Interior. The Department of the Interior will then assess the software to determine if it meets federal standards for safety and data protection. If the software is deemed acceptable, it is added to the National Park Service's list of acceptable software for use during programs. This submission and evaluation process can take up to nine months.

Due to the long process associated with getting new software approved by the federal government, nearly every park ranger we interviewed limited their technological platforms to Microsoft products, which have already been approved by the Department of the Interior. Some park rangers at parks such as Dinosaur National Monument utilize Skype in the Classroom for synchronous programs since it is a partner platform to Microsoft. National park employees throughout the country can only host distance learning programs on Microsoft Teams; however, to bypass this federal limitation, most park rangers request teachers to host a meeting room on their preferred video conferencing platform and invite park staff to attend. Teachers hosting the meeting are also in better compliance with technology regulations in place by schools (some schools can only use one video conferencing platform). Since the park ranger in such situations is not hosting the video conference, they are legally allowed to present their program without data security or privacy concerns.

Keep the Technology Simple to Reduce Needed Tech Support

Rather than relying on the technology to create engaging programs, the NPS educators should sustain engagement within the lesson plan itself. The interviewee from Yellowstone National Park specifically mentioned that the simpler the programs are, the less tech support is required. Tech-heavy programs are not necessary if the content is well designed; the technology should only serve as the delivery tool. Most national parks do not require extensive tech support because they use basic technology, and their education staff are capable of handling basic troubleshooting and general maintenance. To handle technical issues during the program, interviewees also mentioned providing a backup, such as printed pictures, in case screen sharing fails. By keeping a physical backup in the form of a prop, significant delays can be avoided due to technical issues.

When tech support is needed, many park employees receive assistance from their IT departments, if they currently have one. However, they can only receive assistance if their distance learning program is entirely federally funded. Some parks, such as Grand Canyon National Park or Gettysburg National Military Park, received a grant from a non-profit partner to purchase equipment needed for a distance learning program. In these cases, the IT department will offer little to no tech support to the distance learning program since it is not federally funded and thus outside their responsibilities as park IT. In order to receive full assistance from the park's IT department, it is necessary to use exclusively NPS technology.

> Simpler programs require less tech support and staff.

Distance Learning Programs are Best Run with Two Rangers

In general, across all interviews of the national park staff, the rangers report to be understaffed. Most parks do not have many park rangers in their education wing either, and only a handful of members are able to run educational programs for their park, especially remote programs. Due to the short-staffed nature of many parks, remote programs were designed to be run by one staff member. This way, if parks needed, two programs could be run at a single time. Not only could these programs be both remote, but park staff hope to run remote programs simultaneously with in-person programs in the future.

The national parks have developed many distance learning programs that can be executed with one to two staff members. Grand Canyon National Park performs their programs in a studio with a green screen, so they have one person performing on camera while the other person manages the technology. They mentioned that, while they can complete a program with one ranger, the transitions between showing objects and presenting from a PowerPoint are more difficult. Acadia National Park performs their programs entirely remotely, so they prefer to have two people running the program: one to present and one to monitor the chat.

Pre- and Post-Visit Materials Should be Supplementary

There were mixed results regarding the importance and availability of pre- and post-visit materials from the NPS distance learning educators interviewed. A few interviewees mentioned that they do not offer these materials since they found that teachers did not use them, thus these parks developed their distance learning programs to be standalone. Other parks have worked closely with school districts and teachers to create pre- and post-visit materials that fit in either with Next Generation Science Standards or with state standards.

A trend throughout the distance learning programs at these parks is to prioritize flexibility of programs to fit the needs of teachers. Multiple interviewees noted that teachers used supplementary materials around half of the time, so the live distance learning programs do not require these materials to be completed by students. Pre- and post- materials were incorporated by teachers into their lessons to provide a deeper learning experience integrated with their curriculum, and help reach standards that teachers are expected to meet.

Pre- and post- visit materials include worksheets and videos. These materials often encourage teachers to get students to prepare questions ahead of time for the question-and-answer section of the distance learning programs. Students are also encouraged to think about their own relationship to areas such as nature and the natural environment close to them. The pre- and post-activities include both digital and physical activities, such as games for students to engage in.

> Prioritize flexibility of programs to best fit the needs of teachers.

The Teacher's Role in Virtual Field Trips

Teachers Bring Their Students on a Field Trip to Meet Standards

Of the many reasons teachers bring their students on a field trip, the most prominent is the curriculum. Every teacher interviewed stated that field trips must support the curriculum to be approved. In this way, field trips are not just a fun time, but they can bring to life what students are learning. Students are able to have a personal and fun learning experience to support the classroom content. Teachers have also stated that field trips can also be a unique experience that students may not have otherwise.

Teachers Serve as the Moderator

The teachers interviewed for this project clarified that the rangers' role is strictly that of a presenter or guest speaker. The rangers are responsible for providing content in a fun, engaging, and energetic way. Since teachers know their students better, they feel most comfortable moderating their class. The responsibilities of the teacher during field trips are to minimize distractions students may have, and to enforce the school's rules.

Platform Assessment

Video and Content Development Software

According to this project's research, educators at national parks throughout the country are utilizing video creation software to edit prerecorded videos for use as either pre- and post-visit materials or as supplementary material for use during a live video conferencing program. The type of video editing software utilized differed among the national park staff interviewed. The most prevalent of the video editing software was Adobe Premiere which is used by staff at four of the twenty national parks interviewed. The only other video editing software mentioned by interviewees was Final Cut which was used by the staff at Thomas Edison National Historical Park. Staff who were interviewed at every other national park either did not utilize video editing software or were unaware of the exact type of software their staff used.

In terms of content development, most national parks rely on Microsoft products such as Microsoft PowerPoint, Microsoft Excel, Microsoft Paint, or Microsoft Word to create lesson activities. As stated earlier, national parks are limited to federally approved software, such as Microsoft products, when operating on government provided networks and computers. For this reason, most national parks rely on Microsoft products to create most of their distance learning material. Some national parks are utilizing presentation software such as Prezi and Google Slides for creating curriculum material. However, this software is only used in the development stage. After this stage, presentations are promptly converted to a PowerPoint file to be used in the official distance learning program.

Green Screen Technology and Software

A common trend among national parks with more sophisticated distance learning programs was the inclusion of green screen technology during video conferencing sessions.
Eight of the twenty national parks whose staff were interviewed made use of green screen technology to present curriculum material during synchronous lessons. These parks include Channel Islands National Park, Sleeping Bear Dunes National Park, Yellowstone National Park, Grand Canyon National Park, Zion National Park, Glacier National Park, Glacier Bay National Park, and Homestead National Park. Four of these particular parks were cited by other interviewees as having superior distance learning programs. According to interviewees, national parks are utilizing green screen technology to present videos and images to students without having to rely on the screen share capabilities of various video conferencing software.

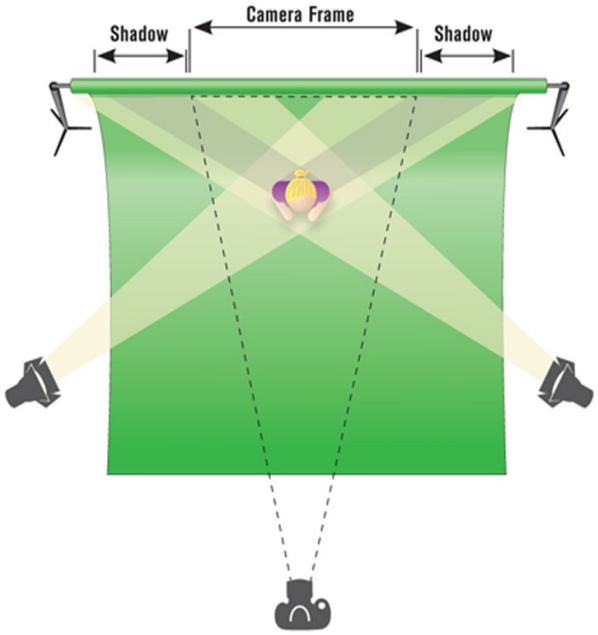


Figure 13: Green Screen Technology. The figure above shows the correct positions for lights up to spread out the light on the green screen and avoid areas of high light concentration.[22]

Three of the eight national parks where green screen technology is currently available manage it using a free live streaming software called Xsplit. In addition, these programs require at least two computers to manage the following: material they intend to present, the video conferencing software, the webcam, and the greenscreen software. According to the staff at these parks, a green screen can make distance learning lessons more interactive since it allows a presenter to be in a standing position, which is more physically expressive and energetic. It also allows them to talk while using their hands and holding up objects without the virtual background obstructing students' view. The presenter can stand in front of the green screen and reference things on it. Using a greenscreen puts the focus of the lesson onto the presenter, rather than a screen shared presentation, which makes it easier for staff to deliver material. A proper green screen setup has the presenter in the center of the frame with two lights angled at them 45 degrees to the left and to the right (shown in figure 13). [22]

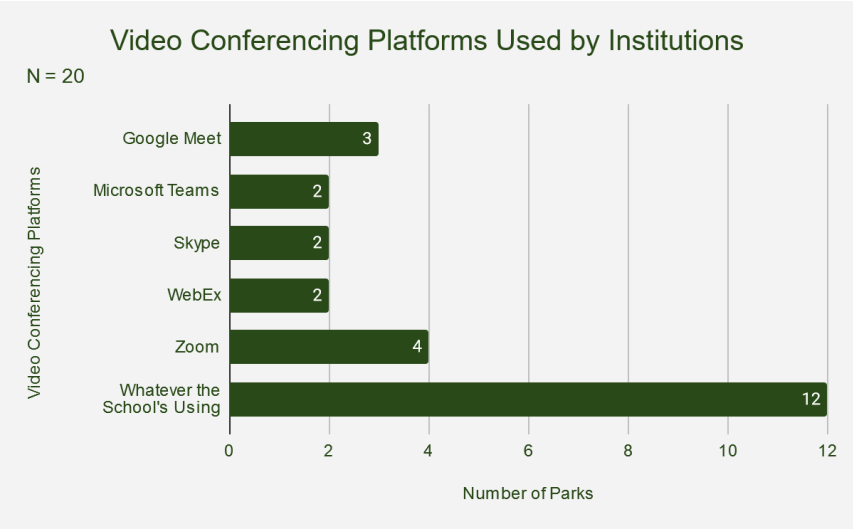


Figure 14: Video Conferencing Platforms Used by Institutions. A bar chart showing how many institutions have used each video conferencing platform for their distance learning lessons. Many will utilize multiple video conferencing platforms, as well as adapt to the platform that the school uses.

Video Conferencing Platforms

The most prominent commonality across all of the park staff interviewees is the video conferencing software used. Although park rangers have mentioned using specific software such as Google Meet, Microsoft Teams, Skype, and Zoom, almost all have stated they prefer whichever platform the teacher is most comfortable with. Figure 14 shows how many parks use each video conferencing platform. Twelve out of twenty parks use whichever platform the school is using. By making themselves compatible with any video conferencing software, students' schedules are not disrupted by the program, and transitions from class to program and back again are facilitated. Additionally, some school districts may have tight security, allowing only authorized people to host or join lessons.

Each video conferencing software has its own benefits and drawbacks. Microsoft Teams is approved for the NPS to use as their official video conferencing software. Park educators are able to host their own Teams meetings and invite others to join as well. However, Teams lacks certain features like Breakout Rooms that are included in other software. Google Meet is used by many school districts because of its easy interfaces with the Google family including Classroom, Docs, Sheets, Slides, and Forms. In contrast, many of Google Meets features are locked behind subscription plans, proving to be costly for school districts. Zoom is another common platform used in classrooms and showcasing its signature Breakout Rooms. Unfortunately, Zoom allows only a limited number of participants on a free account at one time. Lastly, many park educators mention using Skype. Skype is one of the oldest video conferencing platforms with a good reputation. A few park staff have mentioned that foreign students will use Skype for field trips to American national parks. However, Skype is intended more for social purposes rather than for academic use. It is easy for students to get distracted from lessons with features such as emojis and the ability for anyone to mute others.

Video conferencing software offers a variety of features, many of which are very helpful for the NPS's programs. Figure 15 shows the number of parks where rangers use each feature. Features such as Breakout Rooms, the chat, hand raise, live captioning, muting, pinning or spotlighting, polls, and even screen sharing have been specifically mentioned by study participants to be useful.

The most popular feature among the parks is the chat. Parks use the chat to allow engagement between students, especially the older students. The chat is an easy way for shy students to participate without having to speak up before the class. Another popular feature is muting. Muting minimizes the distractions that can occur by students talking to one another, background noise, or microphone feedback. Other helpful features such as hand raise and pinning can keep

students quiet, relaxed, and organized as they follow along with the program. Features such as Breakout Rooms and polling can provide interactive experiences between students and rangers.

Scheduling and Evaluation Software

The Center for Interactive Learning and Collaboration, Skype in the Classroom, and Teams in the Classroom are all programs for organizations to advertise their distance learning programs so people can register for them. These programs are useful to gain a wider audience; however, they require a paid subscription. They also offer valuable opportunities for teachers to provide feedback and evaluate distance learning programs.

Creation of an Effective Distance Learning Lesson Plan

The lesson plan serves to satisfy the outcomes and clarity requirements of the four aces. The distance learning program presented in this project was designed for third graders, who may not be as invested in their long-term learning goals as might be a high schooler. The lesson plan outlines the outcomes and clarity for the teachers, who will take care of these aces for the students. The activities within the lesson plan emphasize engagement and enthusiasm for the students, as these aces are especially important at the elementary level.

Components of a Lesson Plan

According to the examination of various lesson plans designed by either teachers or national park educators, a list of components necessary to formulate an effective lesson plan was compiled. The primary component of a lesson plan is a learning objective that students are expected to reach upon completion of the program. This learning objective is the guiding factor that determines the development of lesson activities. These objectives are usually supported by essential questions that reinforce and expand upon the objective. Another critical component is the inclusion of curriculum standards. For national park lesson plans, these standards are usually meant to match the Next Generation Science Standards, Common Core standards, or a specific state's educational standards.

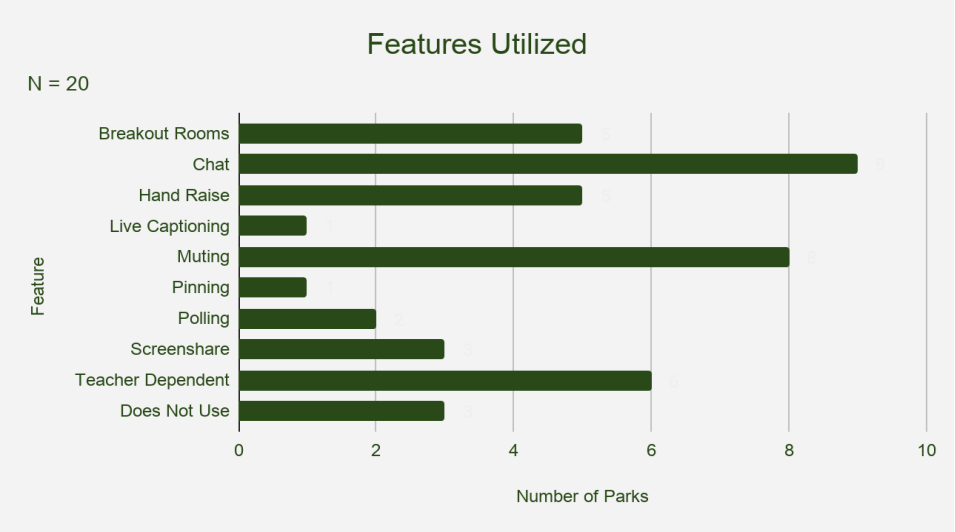


Figure 15: Platform Features Utilized. A bar chart showing how many parks use different features of video conferencing platforms.

In addition to standards and learning objectives, every lesson plan studied for this project included a summary or background section that provided all the information an educator would need to understand the topic being discussed during the lesson. Following this background section, most of the lesson plans studied included detailed instructions on how to execute the lesson itself. Some of the lesson plans studied had a section dedicated entirely to vocabulary words that students were expected to know by the end of the lesson.

Importance of Learning Objectives

In a manner reminiscent of outcomes and clarity in the four aces, the lesson plans gathered from various teachers and national parks all had a section dedicated to clarifying the learning objectives of the lesson. These objectives were usually located at the very beginning of the lesson plan or directly prior to a specific activity within the lesson plan. All the learning objectives the team examined were designed to describe the student learning expectations upon completion of the program. These learning objectives usually included simple action verbs such as identify, describe, explain, compare, contrast, etc. that marked something students would be able to achieve once the lesson had been concluded. In most cases, these learning objectives were formatted to finish the statement "Upon completing the lesson, the students will be able to…". The inclusion of an objectives section in nearly every lesson plan, as well as the outcomes and clarity objective of the four aces, leads to the conclusion that an objective is vital to creating an effective lesson plan.

A Virtual Field Trip Should Include Optional Pre- and Post-Visit Activities

The goal of the pre- and post-visit activities is to provide teachers with the tools to create an enriching learning experience from a Rock Creek Park field trip. However, not every teacher has the time in their schedule to effectively utilize pre- and post-visit activities with their students. Thus, it was important to design pre- and post- activities that complement the virtual field trip, but are not required to participate. The lessons also needed to be at a 3rd grade level and satisfy curriculum requirements. From teacher interviews and reviewing the DC public school's 3rd grade curriculum, the team learned that 3rd grade students should be focusing on comparing past and present, learning a chronological sequence of events, and developing vocabulary. Third graders learn best with a lot of interaction, and enjoy educational games such as "Jeopardy".

The team created activities with the engagement and enthusiasm objectives of the four aces in mind. Each activity was designed to be engaging and interactive for the students. The PowerPoints designed to deliver the content were designed to be visually appealing and contain animations to captivate and engage the students. There are several points within each activity where students are asked to participate either verbally or with gestures, and there are multiple reflection questions embedded within the activities. These elements, partnered with an enthusiastic presenter, satisfy the engagement and enthusiasm elements.

The team created the following pre lesson activities: a Then and Now presentation, A Tiny History of Peirce Mill storybook, and a fill in the blank vocabulary activity. The Then and Now presentation (shown in figure 16) focuses on comparing objects used in the past with similar objects used today, showing that people's needs have remained constant while the materials used have changed. The slides are hyperlinked such that a congratulatory message is displayed when the right choice is clicked and a message prompting the user to try again displays when a wrong choice is clicked. A Tiny History of Peirce Mill (shown in figure 17) is an animated PowerPoint presentation that mimics a storybook. It focuses on developing an understanding of events in chronological order. The pages "turn" with the use of the page turn transition to create an engaging reading experience for the students. The Fill in the Blank Vocabulary activity (shown in figure 18) prepares students for the words that they will hear during the field trip. This activity teaches the definition of the word, as well as how to use the word in a sentence to prepare the students for some of the words they may hear on the field trip.

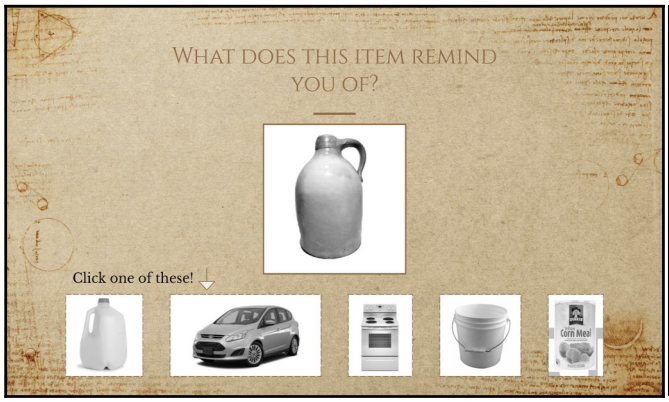


Figure 16: Then and Now matching activity PowerPoint.

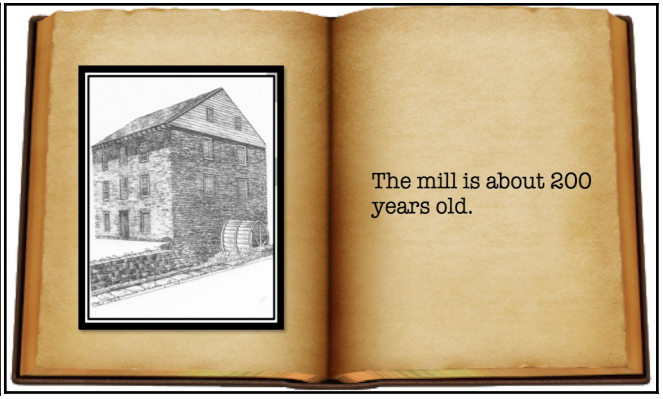


Figure 17: A Tiny History of Peirce Mill story book PowerPoint.

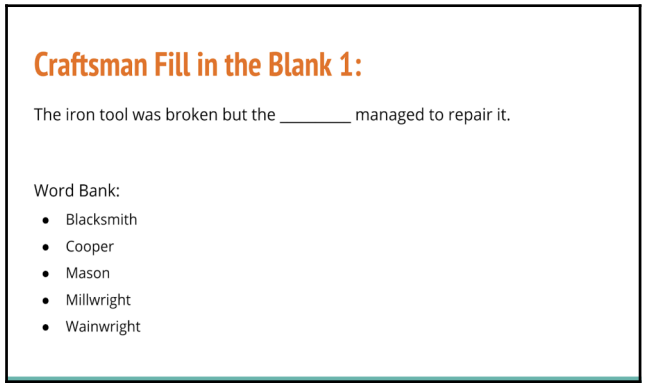


Figure 18: Fill in the Blank Vocabulary activity.

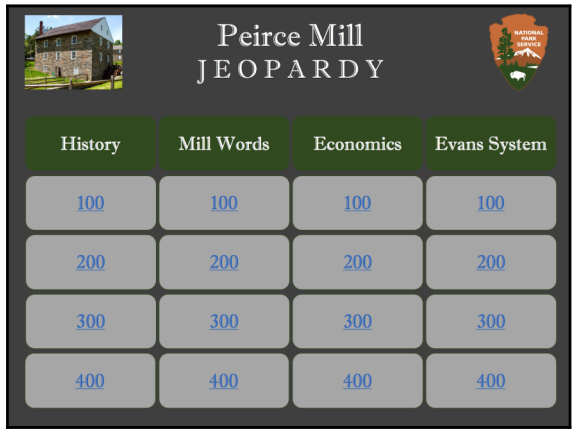


Figure 19: Peirce Mill Jeopardy PowerPoint game.

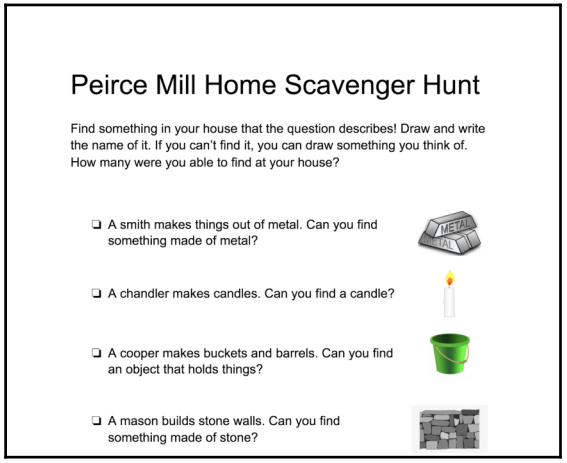


Figure 20: An at-home scavenger hunt.

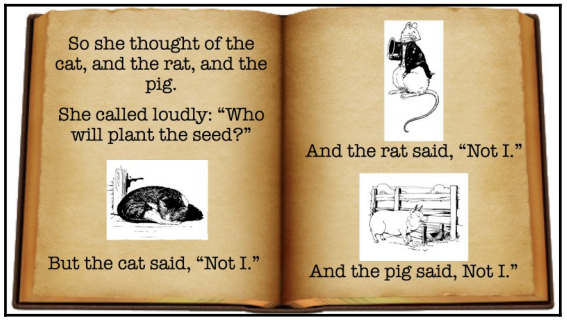


Figure 21: The Little Red Hen storybook PowerPoint.

The team created the following post-visit activities: Peirce Mill Jeopardy, a home scavenger hunt, and The Little Red Hen storybook. The Peirce Mill Jeopardy (shown in figure 19) game serves as a game style assessment to ensure that students remember the key vocabulary and history facts from the field trip. The teacher acts as the moderator and walks the students through this jeopardy game that reinforces the concepts from the virtual field trip. The home scavenger hunt (shown in figure 20) serves to complement the Peirce Mill outdoor scavenger hunt created by educational staff at Rock Creek Park. The prompts reinforce topics covered during the field trip and encourage them to explore their own environments. The Little Red Hen storybook (shown in figure 21) is a PowerPoint version of the book about a hen baking bread and the importance of collaborating. The pages "turn" with the use of the page turn transition to create an engaging reading experience for the students.

Providing the Staff with Distance Learning Tips

A staff training tip sheet was created based on the advice and training materials of the interviewees (the staff tip sheet can be seen in the supplementary materials). The first section of the tip sheet gives guidance for what to do before and how to set up programs. This is split into two subheadings, tips for meeting logistics and communication with teachers. Multiple educators from parks and institutions mentioned the need to communicate as early as possible with teachers about their class's content needs and to be aware of any disability accommodations needed during programs. Rangers should be aware whether they are joining a meeting hosted by the teacher, or if they will invite the class to a video conferencing meeting. Rangers should be sure to learn what platforms and features teachers are comfortable using for their classes and to plan their programs around them.

> Technical difficulties are inevitable—always be prepared with a backup plan

The second section of the tip sheet provides guidance for how to run a distance learning program including how to deliver the program itself, as well as moderating the students. There is guidance for steps to perform upon entering a meeting, and how to prepare props and physical print outs. Presentation and delivery tips are a major part of this section. For example, issues and mistakes are inevitable; rangers should be prepared with a backup plan. Rangers should practice presenting their programs to colleagues, and watch recordings of themselves to improve their delivery over video conferencing platforms. Regarding moderation, rangers should aim to be flexible and follow classroom procedures, since that's what the children will be most comfortable with. Other interviewees suggested roleplaying troubleshooting scenarios and preparing themselves to use alternatives to screen share or videos if those features do not work. This tip sheet also includes information on using platform features, such as muting and the chat feature for younger and older elementary students. It lastly includes what to do after a distance learning program is over, such as receive feedback from teachers, and to send out a thank you or a survey to teachers. Feedback is vital to improving future distance learning programs.

Distance Learning Program Synopsis

The project goal was to assist Rock Creek Park with their distance learning initiative by assessing the distance learning technology currently in use by other national parks, developing interactive virtual lessons about Peirce Mill for 3rd grade students, and creating a staff tip sheet for the park and partners. First, educational staff from a number of various National Parks and other institutions were interviewed about their own distance learning initiatives. In addition to these interviews, teachers who have taught at the elementary level were also interviewed on their distance learning initiatives. Between these two sets of interviews, we compiled data on topics such as platforms, interactivity, advice, the roles of both teacher and ranger. With this information, spreadsheets were created to organize the data. Next, lesson plans and corresponding activities were created. Many variables were considered in the creation of the lessons and the plans, such as educational value, engagement, the technology, and the convenience for both rangers and teachers. Finally, a park staff tip sheet document was compiled from the interviews conducted as well as the written material provided by staff from different National Parks. The tip sheet covered topics such as how the meeting should run, talking with teachers, entering a program, presenting, moderating, troubleshooting, and closing a program. Additionally, any instructions for the lessons created were provided, such as how to deliver a lesson or how to recreate a lesson for a different topic.

Recommendations

This section contains a summary of the group's recommendations to Rock Creek Park for their distance learning program. It includes the collected tips for distance learning programs, tools and platforms for distance learning, disability measures, and distance learning program assessment tools.

Collected Tips for Distance Learning Programs

Focus on the Synchronous Programs

The synchronous program from the parks will be the main source of content for students during their virtual visits to NPS facilities. Pre and post lesson materials should enrich the virtual field trip; however, the virtual field trip should not be dependent on their completion. Parks do not rely on student understanding of pre-lesson content before a field trip because NPS staff have noticed that not all teachers use these pre-lesson materials. Therefore, many parks have changed their pre- and post- lesson material to be optional. These materials provide additive knowledge, rather than building on this material in the synchronous program. Optional pre- and post- activities allow for teachers to choose whether they would like to turn the virtual field trip into a complete learning experience or use the trip as a way to add some variety to their classroom.

Use Props and Movement

Almost all of the park educators interviewed reported that they use either props, body movement, or some combination of the two during their live lessons. The use of both props and body movement keeps students engaged in the program by changing the pace of what they're doing. The use of props is also a key visual representation of what students are learning about. Body movement is a productive way to allow students to move about while keeping the topic educational. Some examples of body movement used effectively in NPS presentations are thumbs up/down reactions, dance breaks, and acting out landforms or animals.

> You need to be extra energetic for your enthusiasm to travel through the screen to the students.

The Teacher's Role

During synchronous programs, most of the park educators interviewed stated that they prefer teachers invite them to the video conferencing meeting and remain the host during the program. Teacher responsibility should consist of moderating students, managing the features they intend to use (such as hand raising), and controlling administrative functions (such as muting students). Teachers know their class best, and keeping the presentation in line with how the teachers usually use the platform will create a more consistent learning environment. Rangers should touch base with the teachers in advance of the visit and ask whether they have students raise their hands physically or with the raise hands function, and if they allow students to use the chat or forbid it. This way, park staff are free to present their material without having to worry

about keeping students from interrupting at inopportune times and thus focused on the material being presented. Teachers also can call on students to participate, thus allowing all students the opportunity to participate in the program equally.

Tools and Platforms for Distance Learning

Video Conferencing

We recommend that Rock Creek Park request that teachers invite them to meetings on the school's preferred platform. If the teacher does not typically use video conferencing, then Rock Creek Park should invite them to an MS Teams meeting, as it is the only platform on which the NPS can currently initiate meetings. Within the video conferencing platform, the following features are useful: chat, ability of host to mute participants, and screen share.

Content Development

Rock Creek Park educators should develop the content for their distance learning programs using a combination of PowerPoint and physical props. In the future, Rock Creek Park should look into getting approval to use a program such as Prezi, as it would be a useful tool to show the journey of corn throughout the milling process.

Recording Space

As rangers will not be able to run live programs from Peirce Mill itself, we recommend that they set up a studio or other program space. Many national parks have been utilizing green screens to bring the park to the classrooms. A physical green screen is a great addition to a program, as it increases contrast between the person and background, allowing for a clearer image of the person. If a green screen is not an option, we recommend that Rock Creek Park set up a recording space with a clean background and nature decorations to create a fun, appropriately themed learning environment.

Software NPS Should Consider for Future Adoption

The National Park Service should consider investing in future software for adoption and approval such as Edpuzzle, Flipgrid, and Kahoot! Edpuzzle is a platform where teachers can choose or upload their own videos to Youtube, then assign questions to specific timestamps. Features include adding multiple-choice questions, open-ended questions, or leaving a note or voiceovers to replace video audio. You can also cut parts of a video. The basic plan allows storage space for twenty videos, and to see detailed analytics on your students' results.[23]

Flipgrid is a platform for sharing short videos in response to prompts teachers can create. Teachers can choose what emails to allow to respond, then send a link out with a join code. Students can add graphics and easily edit video responses. They can also respond to fellow students' videos with comments or another video[qq]. An example usage is having students record themselves using words in a sentence for a vocabulary activity.[24]

Kahoot! is a platform that is a fun way for students to test their trivia knowledge on a variety of different topics. It is possible to both use other's quizzes, as well as to make your own on a specific topic. Quizzing platforms can be very engaging by giving students a sense of competition while evaluating the retention of the material taught. These platforms are better used for older students because of the multiple steps to access a quiz.[25]

Accessibility Measures

There are three aspects national parks should include in their distance learning programs and materials to meet the needs of students with disabilities: baseline accommodations of live/closed captioning; audio descriptions; and 508 compliance should be provided whenever possible. In addition, the parks should work individually with teachers to meet any other needs.

Live and Closed Captioning

Distance learning programs for classes with students who are deaf or have hearing impairments should include captioning. Rangers can use a video conferencing software, such as zoom, or a third party that provides closed captions for live, synchronous programs. Teachers with students who need live captioning likely use Zoom or another video conferencing software that provides captioning, so joining a teacher's regular class meeting helps students continue receiving the accommodations they need. Videos that are used in program slideshows or other materials should also be captioned.

Audio Descriptions

Distance learning programs for classes with students who are blind or have visual impairments should include audio descriptions, which are descriptions of visual elements necessary inserted between the natural audio of the video. The NPS offers accessibility training in a partnership with the National Center on Accessibility. Rangers could complete training and have

notes for each visual aid used during distance learning programs prepared ahead of time to read to classes with visually impaired students.[26]

508 Compliant Documents

Rangers should make sure all documents available for students are 508 compliant. The NPS has information on best practices when formatting documents to ensure that they are accessible and 508 compliant.[27]

Work on an Individual Basis with Teachers

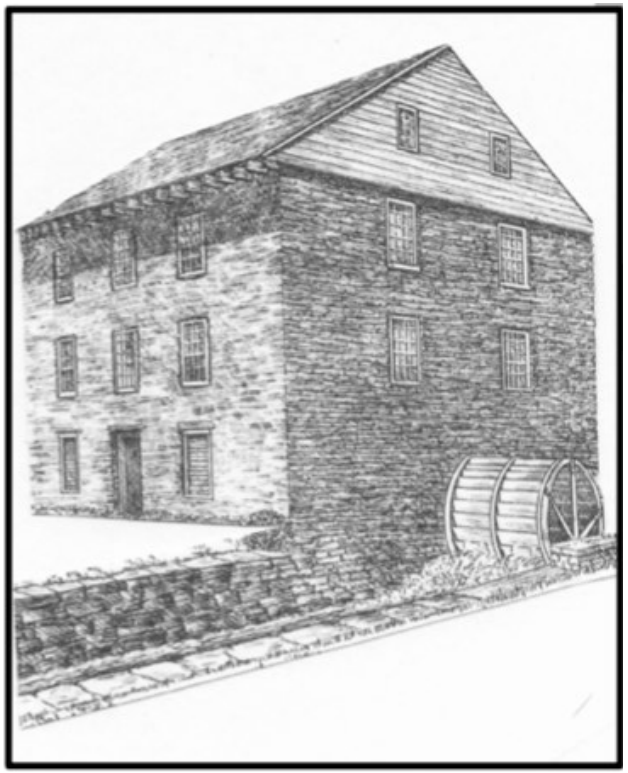
National Park Service rangers should make sure teachers let them know when requesting programs what their specific class and students with disabilities' needs are, and what accessibility measures the schools and teachers can provide or are presently providing for such students. This advanced notice lets rangers know how to change lessons to fit student needs and provide third party assistance if required.

Distance Learning Program Assessment Tools

National parks throughout the National Park Service are utilizing various informal assessment methods to determine program effectiveness. As a result, the type of information being collected varies from park to park. Comparing the program assessment data from each park to one another is difficult, and conclusions drawn may be unreliable. We recommend that the National Park Service design a uniform formal assessment methodology to determine program effectiveness, which would allow parks to compare and contrast program effectiveness data.

Ethics

This project was executed to fulfill the Interactive Qualifying Project through Worcester Polytechnic Institute. This information is for academic research only, in order to fulfill the project goal and design distance learning plans. The psychological and physical safety of interviewees and subjects was maintained through keeping responses confidential and anonymous. Interviewees had the right to leave any questions unanswered, and direct quotes were only used with explicit permission. The opinions stated in this proposal do not represent the opinions of WPI or the NPS.



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