Final Project Executive Summary

Comparing the Effects of Synchronous Virtual Programs vs Asynchronous Virtual Programs on Student Engagement and Information Retention

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The World Zoo and Aquarium Association (WAZA) describes education as having a central role in zoos and aquariums (WAZA, 2005). In their conservation strategy published in 2005, the WAZA mentions "progress in conservation depends upon the development of public understanding of the relationships between species, the environment, and people's own attitudes and actions" (WAZA, 2005). The association also believes that "zoos and aquariums enable people to develop appreciation, wonder, respect, understanding, care, and concern about nature" (WAZA, 2005).

When the Covid pandemic occurred in 2020, students had to switch from learning in the classroom to learning through a webcam. As a result, they had to miss out on a year's worth of in-person learning and a year's worth of field trips. Many zoos, aquariums, and museums had to figure out a way to still provide a fun and educational program to students of all ages despite it not being in-person. An article posted on the Association of Zoos and Aquariums' (AZA) website focused on five AZA accredited facilities that had to adapt to a new, virtual format (Bradshaw et. al, 2021). One of these facilities, the North Carolina Zoo in Asheboro, North Carolina met this challenge through virtual summer camps, Facebook Lives, and nature play videos. Through these means, the zoo was able to reach people in 15 countries and 35 states as well as garner over 1 million views on their Facebook videos (Bradshaw et. al, 2021). The Saint Louis Zoo also offered virtual programming for the 2020-2021 school year which provided "a sense of "fun"

and "normalcy" during a year in which they were not allowed to take field trips" (Bradshaw et. al, 2021). According to the post-program evaluations the Saint Louis Zoo sent out to over 6,000 teachers showed that 99% of those that answered the survey were interested in continuing with virtual programs for the 2021-2022 school year (Bradshaw et. al, 2021). As a result, the Saint Louis Zoo has decided to continue offering virtual program options for students.

For this project, I compared two types of virtual educational programs- synchronous virtual programs and asynchronous virtual programs- for the Micke Grove Zoo in Lodi, California to see if one version is better at keeping students engaged and results in better short-term information retention. When I say virtual, what I mean is that all of these programs are taking place through a computer screen rather than with me in the classroom with the students. I use the term synchronous to refer to the version of my virtual programs that are conducted over a Zoom meeting. I use this term because the programs are happening while I am present, and the students and I are able to talk to each other throughout the program. I use the term asynchronous to refer to the version of my virtual programs that are pre-recorded and sent to teachers via email. I use this term because the programs are not happening in my presence, but rather the teacher and the students conduct the program on their own and the students and I are not able to talk with one another during the program.

The synchronous virtual and asynchronous virtual programs covered the same topics: Animal Classifications, Habitats and Adaptations, and Wildlife Conservation. The Animal Classifications and the Habitats and Adaptations programs already had in-person versions while I created the Wildlife Conservation program from scratch. All three programs were designed to follow California's science standards and can be adjusted to cover each set of science standards for grades TK-8.

The synchronous virtual programs involve me talking to classrooms over a zoom meeting and utilizing a PowerPoint presentation, biofacts (furs, skulls, feathers, etc. that were confiscated from poachers by California Fish and Wildlife), and live animals to aid in the programs.
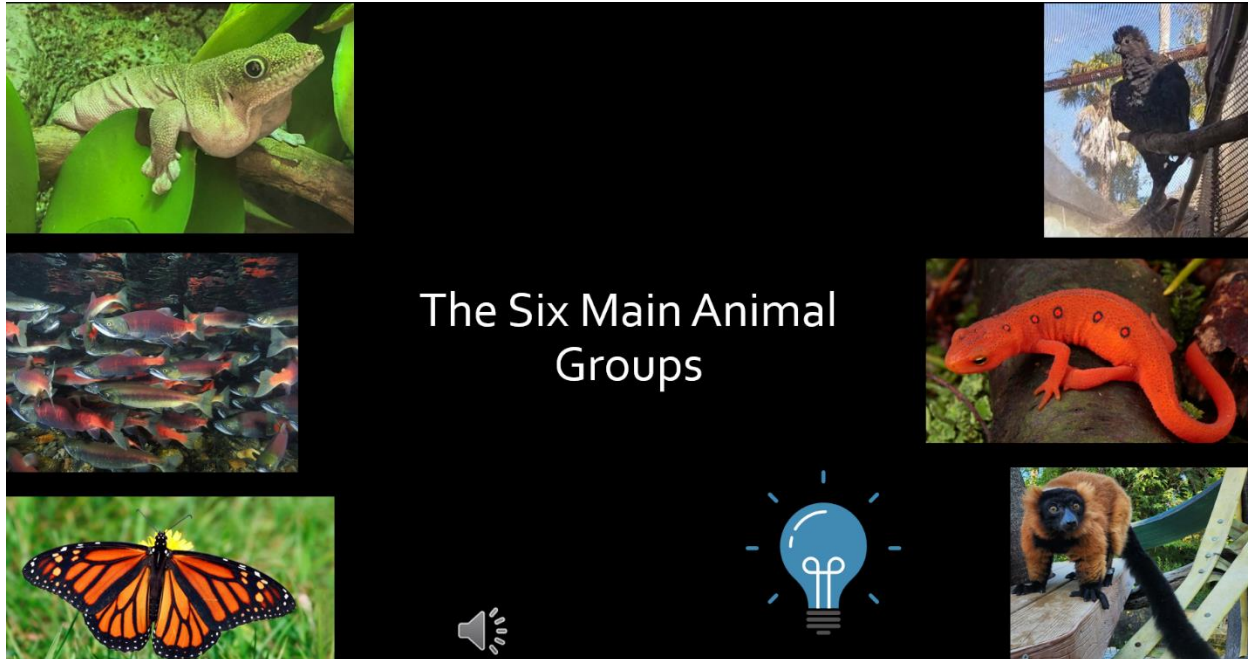

Figure 1: Animal Classifications: Synchronous Version

Meanwhile, the asynchronous virtual programs consist of a PowerPoint presentation with my voice recorded for each slide discussing the material covered. To make this version more interesting, I made it in a "choose your own adventure" format so that students can decide the order they want to learn. I also added questions throughout the presentation that required students to select what they thought was the correct answer. Since this version of my programs are pre-recorded and don't involve me talking to the students directly, I was not able to use live animals or biofacts. Due to technological and financial limitations, I was only able to use

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[1] Images: Micke Grove Zoo (2023); National Geographic (2023)

voiceovers on PowerPoint presentations. However, I included various pictures and charts to help

talk about each program topic.

₂ *Figure 2: Animal Classifications:*
Asynchronous Version

I measured whether or not my programs were successful in student engagement and

short-term information retention through a game I created called *Yes, No, Maybe So*. This game

involved students answering five 'yes' or 'no' questions about the program they participated in

with the questions either being pulled directly from the program or relating to the program topic.

There were two ways students could play this game, depending on what the teacher preferred.

One version had students move to the part of the classroom that represented their answer choice.

For instance, the left side of the classroom was the 'yes' side, the right side of the classroom was

designated as the 'no' side, and the middle of the classroom was the 'maybe' area. The other

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[2] Images: Micke Grove Zoo (2023); National Geographic (2018); National Geographic Kids (2018)

version of this game involved students raising their hands if they thought the answer was 'yes', 'no', or 'maybe'.

Once I finished creating all of my programs, I went on to create my survey using Dillman et al.'s *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method* (2014) to help me create survey questions. I created my survey on Qualtrics Experience Management (Qualtrix. 2023) since it was free to use through Oregon State University and I had used it for ST 539: Survey Methods, so I was used to the program. The questions I had used for my survey are shown in *Appendix A*.

Eleven classes, with 15-30 students per class, participated in a synchronous program while zero classes participated in the asynchronous programs. Even though eleven programs were conducted, some of the teachers didn't answer all of the questions in the survey. There also wasn't a pattern to the survey responses. Overall, all three programs received positive feedback with no clear indication if one program topic was more successful or if one grade level was more receptive to the program.

The majority of the teachers felt their program met California's science standards. In terms of my goals of student engagement and information retention (at least for the short-term), I believe my programs were effective based on how the teachers responded to how well they think their students did in the *Yes, No, Maybe So* game. That being said, having the students play *Yes, No, Maybe So* might not be 100% accurate in determining the levels of student engagement and information retention. There is room for improvement if I want to continue using this game in the future. For instance, I or the teacher could keep track of how many questions each student

answered correctly or even just kept track of how many students answered each question correctly.

From the results I received from my survey, it doesn't look like the effectiveness of meeting my goals varied by grade level or program. I only had one teacher interested in my *Wildlife Conservation* program, so this topic is a little hard to judge. However, I had a pretty good mix of grade levels for the other two program topics, and it seems like the programs were well-received by the students, according to some of the responses I received from the teachers that answered my survey. From the feedback I got, it seems more like the effectiveness of my programs was impacted by what I did or didn't use for my programs. For instance, one teacher commented that it would have been nice to have shown their students a live amphibian while talking about them. Another teacher mentioned that doing a virtual zoo tour so that students could see the animals in their enclosures could have improved their program. A third teacher mentioned how their students enjoyed seeing the animals I was able to show, given that those students don't get many opportunities to see animals like tortoises or snakes or Vietnamese walking sticks. My project didn't meet my goal of seeing if one form of virtual programming was more effective than the other since I wasn't able to get any teachers to participate in the asynchronous versions.

This project wasn't research-based; however, it could be used as part of the groundwork for future research on how successful virtual programs are in terms of student engagement and information retention. For example, this project could be expanded to cover the entire state of California so that other informal learning facilities could participate. If more information is collected via surveys about how the synchronous and asynchronous programs were in terms of student engagement and information retention, then these places could get a better idea of

whether or not one type of programming is superior to the other. Then, an outline of virtual

programs could be created so that zoos, aquariums, museums, etc. could have a more universal

format that they can create virtual programs with. If that's successful, then this virtual program

outline could be adjusted to meet science standards in other states so that informal learning

institutions around the country would have a guide to creating successful virtual programs.

Appendix A: Program Survey

Did your class participate in a live virtual program (with a zoo educator over zoom) or a fully virtual program (without a zoo educator over zoom)?

○ Live Virtual Program

○ Fully Virtual Program

Which program did your class participate in?

○ Habitats and Adaptations

○ Animal Classifications

○ Wildlife Conservation

○ Custom Program

What was the name of your custom program?

What grade level (or levels) participated in the program?

How well did the program meet California's science standards for the grade level(s)?

In the game played at the end of the program, how many questions did the majority of students answer correctly?

○ All

○ Most

○ Some

○ A Few

○ None

Do you think the program was an engaging learning experience for your students?

○ Yes

○ No

Would you have future students participate in the program? Please explain why or why not.

Feel free to add any additional comments you have about the program your class participated in!

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