Creating Online Learning Materials Regarding Human-Cheetah Conflict for the Cheetah Conservation Fund

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Earth Expedition: Connected Conservation-Biology: 641 Section I

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August 5, 2020

Abstract

The Cheetah Conservation Fund (CCF) was established in 1990 and has worked to create relationships with local stakeholders in an effort to reduce human-wildlife conflict with cheetahs. Throughout the years CCF has developed three resources to use in their educational endeavors. Per their request our group has focused on creating educational materials for high school students based on Chapter 13, *The Costs and Causes of Human-Cheetah Conflict on Livestock and Game Farms*, of CCF's *Cheetahs: Biology and Conservation* textbook. These educational resources include an animation based on '*Boots' Story*', a matching game, a spot the difference game, a story map, a piktochart, trivia game, a pledge for change, and a mindfulness activity. These online educational elements are designed to assist CCF in their goal of reaching a larger audience by having these sources available online for students to use all over the world. These interactive and engaging online elements will help bring this conservation story to life and help motivate students to share the information they learn and make a behavior change to help save the cheetah. Our group received feedback about our different elements from CCF staff members and local high school teachers to ensure our educational materials are appropriate for high school students, the materials are presented in an engaging manner, and the materials are effective in conveying information regarding human-cheetah conflict. These elements will inspire and motivate students to help raise awareness and protect the cheetah.

Keywords: human-wildlife conflict, cheetah, behavior change, online learning, ADI instructional model, SOLE - Self Organized Learning Environment

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The Cheetah Conservation Fund (CCF) was founded in 1990 by Dr. Laurie Marker. Dr. Marker spent many years working as a zoo keeper where she learned of her passion for cheetahs. She began doing cheetah research in Namibia in 1977 where she learned about human-wildlife conflict. As stated on the Cheetah Conservation Fund's website (2020), Dr. Marker realized:

"We always think there is someone else who will do something, that 'they' will take care of it. I realized early in my work that there is no 'they', and so I decided I would take action to save the cheetah from extinction".

We felt that passion and decided to take action to help raise awareness and educate students on human-cheetah conflict with the hope of changing student behavior to reflect a more positive attitude toward cheetahs. The focus at CCF is to increase the cheetah population through conservation, research, and education. The main facility features a creamery, model farm, genetics lab, veterinary clinic, and museum (Cheetah Conservation Fund, 2020). Dr. Marker is a firm believer that if we save the cheetah, we can save the world (Cheetah Conservation Fund, 2020).

Our conservation campaign centered around the Cheetah Conservation Fund's human-wildlife conflict priority by incorporating the organization's major programs of research, conservation, and education. Research conducted by CCF and other organizations regarding the costs of the human-cheetah conflict were analyzed and incorporated throughout our project. Our focus was to educate high school students on the costs of human-cheetah conflicts, the factors

that affect those costs, ways to reduce human-cheetah conflict, and how to develop strategies for long-term human-cheetah coexistence.

One of the major Project *Dragonfly* conservation campaign requests from the Cheetah Conservation Fund was to create technological platforms to complement information found within their newly issued textbook that could be made more accessible to students around the world. Duffy (2008) points out that using technology to reach a younger audience not only captivates their attention, but can also rapidly change as the information changes. The results of our literature review indicate a need for technology and games within the classroom. With this in mind, our conservation campaign focused on the establishment of online learning materials that encompassed varying technological aspects to engage students.

We developed several online games and other activities to mirror the information discussed in Chapter 13, *The Costs and Causes of Human-Cheetah Conflict on Livestock and Game Farms*, of CCF's *Cheetahs: Biology and Conservation* textbook. We also incorporated relevant information from the CCF's Teacher's Resources Guide *A Predator's Role in the Ecosystem,* and their *Integrated Livestock and Predator Management: A Farmer's Guide.* By referencing the organization's three core books we will provide a solid in-depth understanding of the risks and solutions of human-cheetah conflict. As a result, having one topic throughout all three books can be incorporated into one foundation thus benefiting the CCF.

Barron (2006) found that students who were inspired by a topic during school were more likely to take interest and act on that interest outside of school. There are several pieces of literature that suggest the use of technology within the classroom has the ability to reach a broader audience and engage the learner more so than the traditional direct instruction or use of

book work. Additionally, the inclusion of games can also impact students and their ability to feel engaged in their learning. Tan et al. (2018) suggests, "Experiential gaming allows students to immerse themselves within scenarios that would likely be found in real life". Further, these gaming experiences allow the student to take on the perspective of another, and in some instances influence them to exercise responsibility for their own lives and surrounding environments.

Our original conservation campaign goal was to develop a stand alone website with all of our additions found within it; however, our group determined it would be best to instead provide the Cheetah Conservation Fund with links to our multiple references, videos, quizzes, and short online games. In doing so, CCF will have the ability to incorporate all of these materials into their already established and frequented website. Our group determined that the use of games and storytelling are two of the most effective ways to provide students with information that will leave them feeling engaged and inspired. Gautam Shah, an IT professional, helped to create a game that allows digital experiences to tell real conservation stories based on data (Machemer, 2020). Having a digital experience that allows one to learn and engage through a conservation story can help draw one into caring and educating others at the same time. Shah believes, "Gaming has a unique ability to connect audiences with wildlife in a deep, personal way that will generate concern and advocacy" (Machemer, 2020).

Additionally, Shah believes that through games, a digital experience with wildlife conservation can be as commonplace as a wildlife documentary (Machemer, 2020). We wanted to be a part of that positive change by reaching high school aged students through technology and games in hopes to increase knowledge, grow their passion, and encourage change. Shah also

states, "It is not that people do not care or do not know the facts, instead it is that people are not being engaged in terms that are relative to their daily lives" (Machemer, 2020). With this in mind, we followed Shah and Duffy's (2008) idea of focusing on games and activities that interact with students; therefore, allowing students the chance to open up and desire to learn more about conservation efforts.

With the creation of our online activities, our group plans to engage worldwide high school aged by making our materials accessible as long as the student has an internet connection. Our hope is that students will gain an in-depth understanding of human-cheetah conflicts, the costs - direct and indirect - that affect both humans and cheetahs, how to reduce human-cheetah conflict, and how to develop strategies for long-term human-cheetah coexistence.

Methods & Materials

Through interactions with the games, quizzes, and videos high school students will be able to learn in an engaging way through their own inquiry. We will strive to turn these students into environmental stewards by teaching them that nature and wildlife belong to all humans as citizens of the world and that we all have a responsibility to protect nature and wildlife, specifically through conservation efforts. We will instill a global understanding by focusing on cheetahs in Namibia and connecting the human-cheetah conflicts that occur there to students all over the world, ensuring that these students know how they can help cheetahs locally from wherever they live.

CCF already has a rich inventory of ideas, stories, images, and information, which they shared with us. In the Teacher's Resources Guide several games and activities are provided for younger students to participate in and we wanted to go more in-depth with those activities and

make them relevant for high school students. In the Namibia Wildlife memory game (Appendix

A) all photos used in that game were taken from pages 109-112 of the Teacher's Resources

Guide. In the Farmer's Guide, resources are provided for farmers in case a conflict arises. We

included these resources into our piktochart to ensure that the information was easily accessible

to those who may need to use it. This guide also has comics and charts that are extremely

relevant to our human-cheetah conflict issue and the images were also used in our piktochart to

share the information in a quick and easy-to-understand manner before students dived deeper

into the topic. The textbook has a detailed map of cheetah ranges which is important to know

where this species roams and what countries may also face these same or similar conflicts with

cheetahs. By knowing what other countries have cheetahs, there can be collaboration between

them to see what works and what does not and hopefully spread tolerance throughout cheetah

ranges.

The piktochart (Appendix B) we created discusses the difference between leopards and

cheetahs and some similarities. Several people, including Namibian farmers, have a difficult time

telling leopards and cheetahs apart. We thought it would be beneficial to our conservation

campaign if we included a comparison on these two cat species that roam the same area we are

focusing on, Namibia. Several people will think one cat species is responsible for damage when

it is the other cat species, so knowing the differences can help identify the correct species. The

piktochart also mentions deterrent methods and resources that farmers can use to reduce conflict

with cheetahs, and other carnivores. We gathered information from CCF's *Cheetahs: Biology

and Conservation* textbook, CCF's teacher's resource guide on *A Predator's Role in the

Ecosystem*, *Integrated Livestock and Predator Management: A Farmer's Guide,* and outside

resources to create this piktochart. Tan et al. (2018) mentions, "Many techniques have emerged to integrate the conservation message with forms of delivery that immerse learners in different perspectives". We wanted to create something that everyone can understand and engage with, and we felt that a piktochart was the best method for this because of the pictures with short pieces of information. Furthermore, to test a students' understanding of the piktochart the student could review their understanding by playing the Spot the Difference Game - Leopard or Cheetah (Appendix C).

The trivia game (Appendix D) was created to test a student's knowledge on human-cheetah conflict, in a fun and engaging way. Tan et al. (2018) states, "That by incorporating active learning principles, games can empower students to exercise responsibility for their own lives and for the environment". We wanted a fun game that could empower a student to want to be the change in order to help cheetahs and encourage them to talk to others about the different ways people can help the cheetah population from anywhere in the world. To create the trivia game we used information that was found throughout chapter 13 of the *Cheetahs: Biology and Conservation* textbook. Since this trivia game uses information from chapter 13, it allows students to test what they learned from that chapter. It discusses the four main themes in the chapter: costs of human-cheetah conflict, factors that affect the costs of human-cheetah conflicts, ways to reduce human-cheetah conflict, and strategies for long-term human-cheetah coexistence. Schumann et al. (2008) learned that actual livestock losses were lower than perceived losses; however, it was the perceived losses that influenced the removal of predators, like the cheetah. Marker and Boast. (2015) stated, "How farmers perceive the damage caused by predators has a deeper and more complex roots than can be simply understood by the

monetary implications of depredation". This has a huge impact on human-cheetah conflicts; therefore, it is crucial we discuss perceived versus actual threats.

We have included *Boots' Story*, from CCF's Teacher's Resources Guide on *A Predator's Role in the Ecosystem*, and turned it into an animation to showcase the importance of having a livestock guardian animal. This animation fits into our discussion on human factors affecting costs towards cheetahs, reducing human-cheetah conflict, and strategies for long-term human-cheetah coexistence. Beck and Cable (2011) claim, "The purpose of the interpretive story is to inspire and to provoke people to broaden their horizons". By creating an interpretive story we are able to draw people in and connect them with our conservation campaign emotionally because a meaningful story makes interpretation provocative (Beck and Cable, 2011). While our target audience is high school students this animation can be used to connect to a younger age group as well.

We included a map of the cheetah's current and historic ranges to show how much habitat and population loss cheetahs have faced. We have included images CCF used in their Teacher's Resource Book, and because this is the second edition of the book we believe they found those images to be of value; therefore, we continued to share those images. We used the Cheetah Conservation Fund's map of cheetah current and historic ranges (Appendix E). We want to have as much of an emotional reaction as possible and seeing the differences between the past and present can create that emotion.

As a final piece to our collection of resources we have created a mindfulness infographic (Appendix F). The goal is for teachers to use this resource after having gone through the other more heavily facted items as a way to wrap up the unit. Students can use the knowledge they

have gained from the resources to reflect on their own role within an ecosystem, how ecosystems are connected, and having a greater connection to nature. The information within the infographic was gleaned from Visalo (2016). Nature reminds us of our own insignificance which is important to remember and can assist our instinct to be connected to nature (Visalo, 2016).

Results and Discussion

Unfortunately, we will not be the ones testing out our technology elements with CCF students. We have consulted with Brian Badger, Director of Conservation and Outreach at CCF, and Justin Birkhoff, Development Manager at CCF for feedback on our StoryMap, piktochart and animation video. We discussed their ideas and wishes as well as if our elements are appropriate for students and CCF. We listened to their feedback and incorporated it into our different elements and activities.

Furthermore, in order to determine the effectiveness of the learning materials we created for high school students to utilize, we devised a series of questions that were sent to three different high school science teachers. These selected educators are all familiar with current high school standards in both science and technology. These questions included:

1. Are the materials suitable for high school students?
2. Are the materials conducive to learning and presented in an engaging manner?
3. Do you believe these learning materials would be effective in conveying information regarding the human-cheetah conflict?

Our group has compiled their responses to highlight specific themes and commonalities among them. The selected teachers felt as if the materials that were established aligned nicely with the cognitive development of a typical high school science/technology classroom. That

being said, high school students present varying abilities of comprehension that range from the

ability to understand concrete concepts and abstract concepts. For high school students, the idea

of cheetah-human conflict may seem relatively abstract. However, the materials that were

created can be presented in such a way that students can build upon their comprehension level

and work their way from concrete to more abstract material. Students can begin learning about

human-cheetah conflict by first participating in reading activities to become familiarized with the

topic and then move into other concrete materials such as the trivia game, matching game, and

other materials that are based on solid fact. Students can then move into more abstract materials

such as the Story Map (Appendix G) and critical thinking questions that require the deeper

mental processes. Further, with the materials being differentiated in a way that is conducive to

the learning of all high school students, the selected teachers felt as if what our group had created

would be effective in conveying the message regarding human-cheetah conflict.

Additionally, the selected educators felt that it was a good idea to create materials that

were solely electronic because current high school students are very familiar with technology

and spend the majority of their day online. These teachers have witnessed a growing trend in

their students and notice that they would rather work online through games and other interactive

activities versus traditional modes of learning such as direct instruction and reading within a

textbook.

We have compiled a Google Doc with the links to all of our project elements for CCF to

use as they desire. We created a StoryMap, quizzes, games, a pictograph, animation video,

pledge, and mindfulness activity. We designed our elements to be very engaging and interactive

for the students. We have different educational elements incorporated into our project and we differentiated learning methods to appeal to all learning styles.

Our campaign does not entail the collection of data to analyze and draw conclusions from; however, we have conducted an extensive literature review regarding appropriate and effective strategies to facilitate learning that engages and inspires students. The findings of our literature review suggest that both the implementation of technology and games both have the power to engage students and leave them feeling inspired to act. This is especially appropriate for conservation education where the goal is to provide knowledge in such a way that leaves the learner more environmentally attuned.

Argument-Driven Inquiry, Story Maps & SOLE

Our group developed an online StoryMap powered by ArcGIS. This StoryMap aligns with The Cheetah Conservation Fund's already established Cheetah Textbook and curriculum. The StoryMap serves as a centralized location in which international instructors/students are able to retrieve and utilize information, videos, and other resources regarding Chapter 13, *The Costs and Causes of Human-Cheetah Conflict on Livestock and Game Farms*. The StoryMap presents the story of Human-Cheetah Conflict in a captivating way as it provides students with maps, videos and photographs that work to bring the story to life and therefore provide students with a more engaging learning experience.

Through the StoryMap, we worked to incorporate parts of the Argument-Driven Inquiry Model model described by Sampson (2014) for the students to follow (Appendix H). We wanted the students to question and observe the data we provided from resources and actual case studies, and allow them to create their own inquiry and predictions. They may not be able to uncover

their own comparative questions within our creations but they will be able to question human-cheetah conflict and compare the conflict to other areas within Africa. Our StoryMap will allow them to think about the findings from the resources and case studies to create their own solutions and share their opinions with others.

The argument-driven inquiry (ADI) instructional model consists of eight stages. These eight stages provide a framework in which students are able to engage in authentic science practices during a laboratory exercise. The process of ADI begins with the teacher identifying a particular phenomenon to investigate or a problem (guiding question) to solve. With this in mind, our group's chosen problem for students to investigate was the "Human-Cheetah Conflict."

Our group worked to implement the ADI instructional model by developing an Esri Story Map as well as a SOLE (Self Organized Learning Environment). The creation of an Esri Story Map allowed our group to combine text, images, multimedia content and geographical maps in order to tell the story of the human-cheetah conflict; whereas the SOLE was chosen as an online platform to aid student inquiry and promote self-empowerment.

The Esri Story Map was developed with the intention of providing students with an online graphic organizer that illuminates the key elements addressed in Chapter 13, *The Costs and Causes of Human-Cheetah Conflict on Livestock and Game Farms,* and CCF's *Cheetahs: Biology and Conservation* textbook. Further, the Story Map was created as an effort to provide students with both qualitative and quantitative data in which students could analyze and determine appropriate measures to help mitigate the human-cheetah conflict. Quantitative data included financial losses attributed to cheetah predation and qualitative data was represented in the form of interview responses of those typically involved in conflict with cheetahs. Students

could then utilize this information while carrying out the ADI exercise through the SOLE. Both the Esri Story Map and the SOLE work together to provide students with both a problem to investigate and a platform to present their findings/solutions.

"Conservation means people need to take action or change their actions" (Maynard, 2020). Maynard (2020) mentions ten wonderful pathways that can help create change and this assisted us in our goal of creating a behavioral change within the high school students. We focused on high school students around the world that gave us a very diverse audience, which needed many diverse paths (Maynard, 2020). We decided to focus on and include five of the ten pathways Maynard (2020) discussed into our conservation campaign. The first path is knowledge and cognitive processing which we felt was important to include because there is a chance that a student hears about the threats and issues cheetahs face and they want to change from that moment. Since they are high school students the chances of that path following through are pretty slim, but there is a chance that a few students want to make a change to help raise awareness and protect the cheetah. We created several online educational elements to inform students about the threats and issues cheetahs face in hopes that the students will take it upon themselves to create a solution and make that change.

The second path is the attitude towards the situation which we interpreted as if we inform the students to care about cheetahs then maybe they will decide to make a change and raise awareness about the cheetah to help increase their population. We thought if we engaged the students through our online elements that they would begin to change their attitude and no longer have negative feelings towards cheetahs and possibly change their behaviors towards cheetahs. The fifth path is social and subjective norms which is multiple people coming together to work

on something they care about. Peer pressure among farmers in Namibia has been shown to increase or decrease carnivore removal, based on the attitudes of those farmers (Marker et, al., 2018). We were hoping if peer pressure can dictate if a carnivore is removed or not, that we could create fun and engaging games in hopes students invite their friends and families to learn and care about cheetahs and wanting to ensure their survival. They can also become involved with the Cheetah Conservation Fund and even take a trip to Namibia to visit the center and see what they do first hand.

The seventh path is behavioral intention which is how they got to this place. We were hoping our interactive educational elements would provide them with information and engage the students to want to make a difference. Farmers in conservancies may have higher tolerance levels towards predators and have a change in tolerance because of continuous engagement of conservation organizations with farmers (Fabiano et al., 2020). We wanted to do something similar so we created a pledge (Appendix I) for students to fill out, feel supported and have resources that can help them learn and understand the cheetah and the threats it faces. We also wanted the students to become inspired to make a change and take action to protect the cheetah. Lastly, the ninth path is emotions and empathy. We wanted to create a connection between the students and cheetahs and share multiple pictures of cheetahs and show that it is a beautiful animal that needs habitat and safety in the wild. We were hoping through our information, games, and other educational elements that our passion would transfer through our work to motivate the students to care and play on their emotions to suggest that they can make a difference and create a positive impact on this world by helping the cheetah from near and far from the cheetahs range. The cheetah is found in less than ten percent of its historical range

which is the largest loss among the large carnivores of greater conservation concern (Fabiano et al., 2020). This proves how important cheetah conservation is and why we need to work together to protect the environment they live in and raise awareness to their species. Ultimately all of the different paths we used all focus on raising awareness about the cheetah and creating a solution that can help the wild population.

Conclusion

The final product of our conservation campaign project entails a story map, piktochart, an animation video, memory game, leopard or cheetah game, trivia game, a pledge, and a mindfulness activity. All of these different educational elements are intended to inspire international high school level students to share the information they have learned, instill in them a motivation to make a change and take action, and to understand the threats and issues surrounding human-cheetah conflict by theorizing their own solutions to the problem. By tailoring our elements to Chapter 13, *The Costs and Causes of Human-Cheetah Conflict on Livestock and Game Farms*, CCF's *Cheetahs: Biology and Conservation* textbook, and *A Predator's Role in the Ecosystem* and their *Integrated Livestock and Predator Management: A Farmer's Guide* we will have aided CCF in their conservation priorities of bringing their resources to life.

These online educational elements will help aid international teachers to review human-cheetah conflict topics with their students. We want the students to question and observe the data we provide from resources and actual case studies, and allow them to create their own inquiry and predictions. With the provided resources we hope students will create action plans that result in a behavioral change. By focusing on cheetahs in Namibia and connecting the

human-cheetah conflicts that occur there to students all over the world we hope to instill a global understanding of the topic that results in students knowing how they can help cheetahs locally from wherever they are.

Future work for this conservation campaign can include testing out our online elements with CCF students. These resources can also be used as a guide for future Miami University graduate students to reference if they would like to assist CCF or other conservation organizations by creating their own resources for topics or chapters in the textbook. We hope that by highlighting other countries where cheetahs live, we can have a positive impact by initiating collaboration between these countries to see what works and what does not in human-cheetah conflicted areas so tolerance for the cheetah can be achieved.

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Appendix A
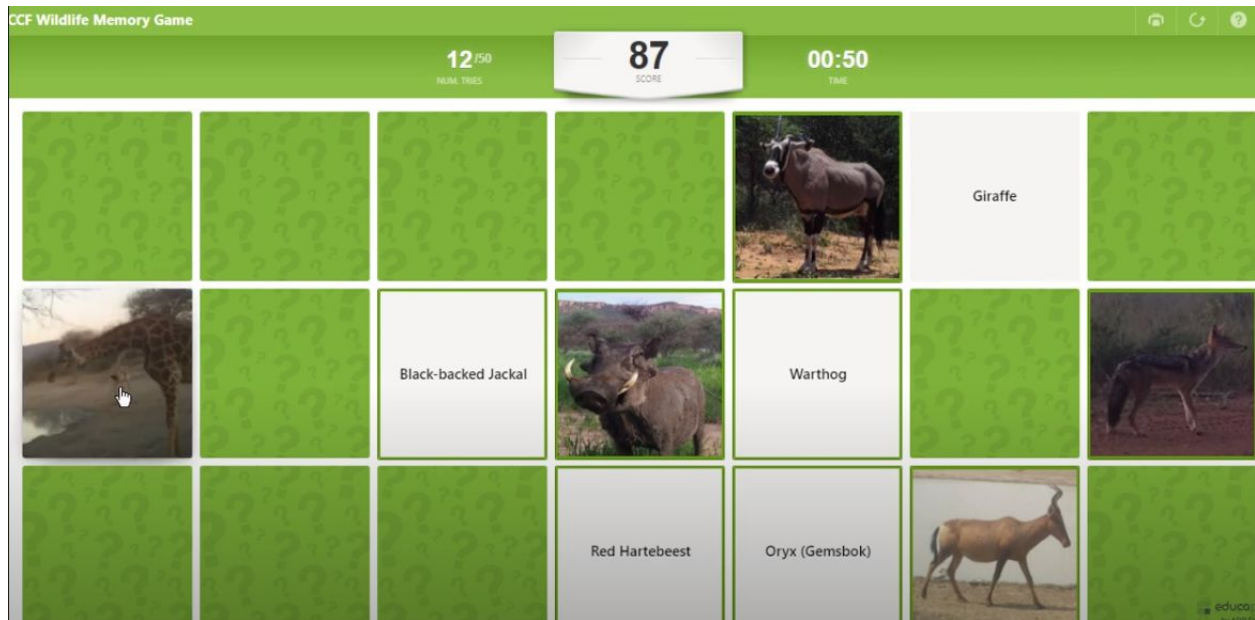
Link to Memory Game - Namibia Wildlife:

https://www.educaplay.com/learning-resources/6286353-ccf_wildlife_memory_game.html

Appendix B

Link to Leopard or Cheetah Piktochart:

https://create.piktochart.com/output/47594985-leopard-or-cheetah
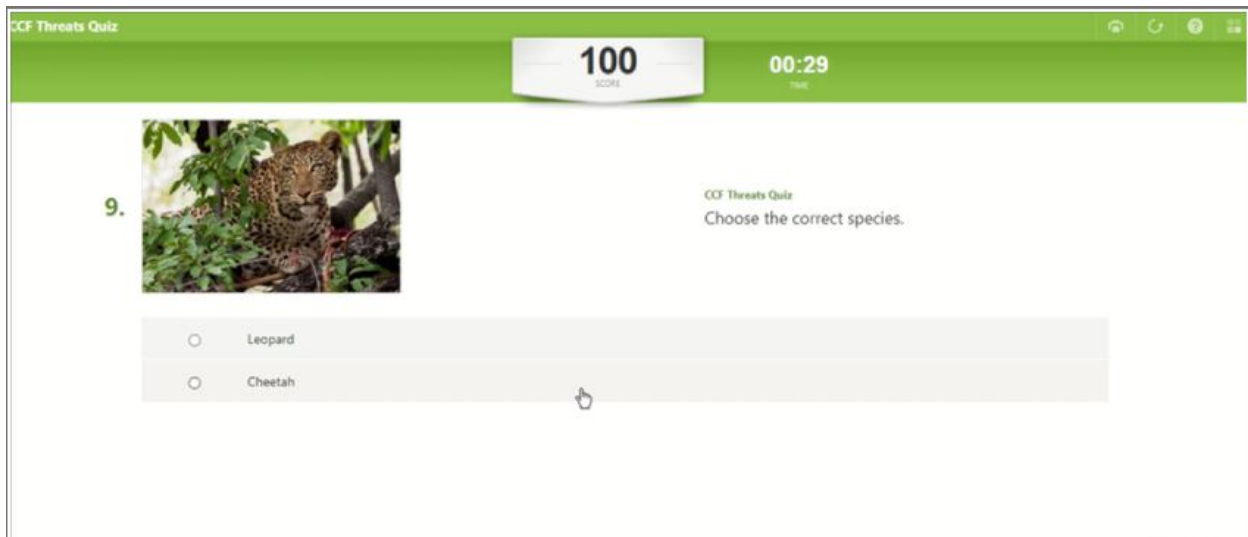
Appendix C

Link to Spot the Difference Game - Leopard or Cheetah?:
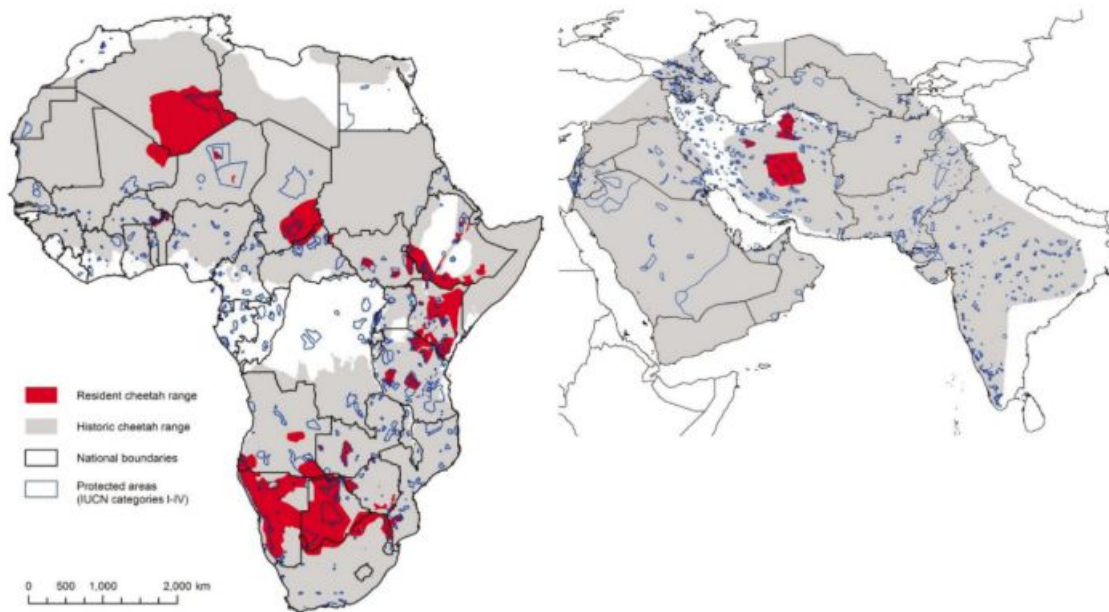https://www.educaplay.com/learning-resources/6286669-ccf_threats_quiz.html

Appendix D

Costs of Human-Cheet..	Factors that Affect ..	Ways to Reduce Human..	Strategies for Long-..
100	100	100	100
200	200	200	200
300	300	300	300
400	400	400	400

Link to Human-Cheetah Conflict Trivia Game:

https://www.triviamaker.com/game-preview/?gm=GD2020070815942312002404

Appendix E

Historic and current ranges of the Cheetah (*Acinonyx jubatus*)

Appendix F

CHEETAH CONSERVATION FUND PRESENTS

BEING MINDFUL IN

A MODERN WORLD

1. TAKE DEEP BREATHS

Close your eyes. Take deep breaths. Think only about the feeling of the air entering and leaving your lungs.

2. BE IN NATURE

Focus on an aspect of nature whether you're able to completely immerse yourself or simply focus on a single plant or bird flying by.

THESE ARE JUST THE BASICS.
LET'S TRY SOMETHING MORE ADVANCED!

3. THINK DEEPER.

Think more about what you're observing. Think about the freedom a bird has with no material possessions holding it back. Think about the deep roots a tree possesses in order to withstand the most severe of storms.

4. MAKE CONNECTIONS

How can you connect what you've seen in your own environment to what you've learned about cheetahs and human-wildlife conflict. And remember: breathe!

VISIT WWW.CHEETAH.ORG FOR MORE INFORMATION

Appendix G

Link to Esri Story Map:

https://storymaps.arcgis.com/stories/e80f12dbf3d74d4b8701609417788bbd
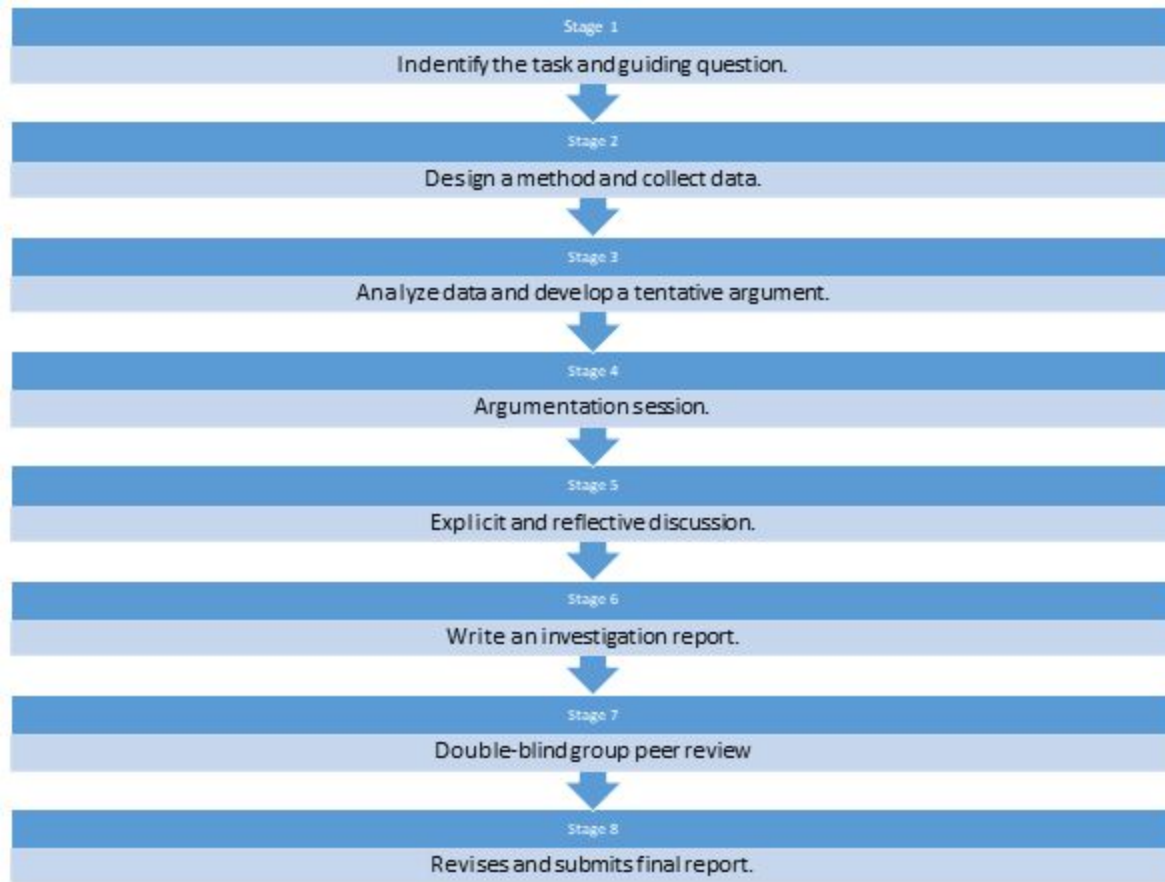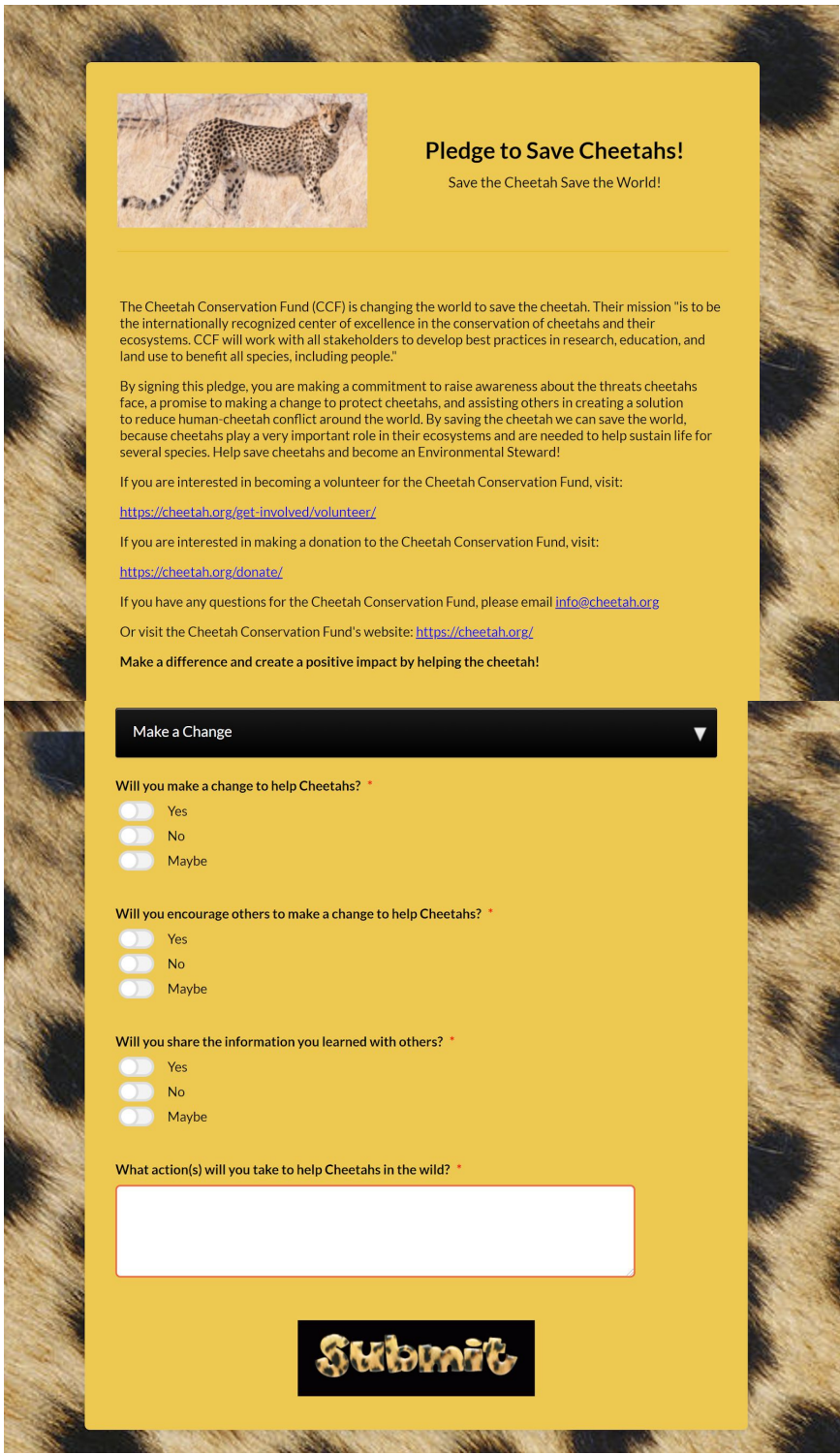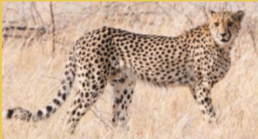
Appendix H

The argument-driven inquiry eight stage process. (Sampson, 2014)

Appendix I

Link to Sign Pledge to Save Cheetahs!: https://form.jotform.com/202026391824147