Seeking the Zika Virus

In this lesson, students will read an informational text from the National Science Foundation. The text describes current research into the mosquitoes that carry the Zika virus, with the ultimate goal of using the research to predict and possibly prevent future outbreaks. Scientists are studying three towns in Ecuador by collecting data to help them discover the socioeconomic and environmental factors that put people most at risk for diseases carried by the Aedes aegypti mosquito, including the Zika virus. The scientists are also examining how virus transmission by these mosquitoes may be affected by climate change. This lesson is designed to support reading in the content area. The lesson plan includes text-dependent questions with an answer key, a writing prompt with a sample response, and a writing rubric.

General Information

**Subject(s):** Science, English Language Arts  
**Grade Level(s):** 9, 10  
**Intended Audience:** Educators  

**Instructional Time:** 1 Hour(s)  
**Resource supports reading in content area:** Yes

**Keywords:** informational text, text complexity, Zika, Zika virus, mosquitoes, mosquito-borne disease, Aedes aegypti, parasite, parasitism

**Instructional Component Type(s):** Lesson Plan, Worksheet, Assessment, Video/Audio/Animation, Text Resource, Formative Assessment  
**Resource Collection:** STEM Reading Resources

Attachment

- Article_SeekingZika.pdf  
- Final_Recommendation_Placement_SeekingZika.pdf  
- Qualitative_Rubric_SeekingZika.pdf  
- Text_Dependent_Questions_SeekingZika.docx  
- RubricforWriting_Prompt_SeekingZika.docx

Lesson Content

**Lesson Plan Template:** General Lesson Plan  

**Learning Objectives:** What should students know and be able to do as a result of this lesson?

- Explain why monitoring the mosquito population is important for making policy decisions about the Zika virus.
- Describe the characteristics of the Zika virus and the factors involved in its transmission.
- Explain the relationship between the Zika virus, mosquitoes, and humans.
- Cite specific and relevant text evidence to support analysis of the text.
- Determine the meaning of selected academic and domain-specific vocabulary from the text.
- Construct a written response that clearly establishes the main point(s), contains relevant textual evidence to support the main point, utilizes transitions to maintain flow, effectively uses domain-specific vocabulary, and provides an appropriate conclusion.
Prior Knowledge: What prior knowledge should students have for this lesson?

In regards to science:
- General familiarity with mosquitoes and their role in an ecosystem would be beneficial to students
- General knowledge of mosquito-borne diseases and how they are spread
- Basic knowledge of binomial nomenclature as used to specifically name/describe a species
- General knowledge of viruses and how they work in terms of human illness
- A basic understanding of the different relationships among organisms
- A basic understanding of socioeconomic conditions that attribute to the environment or ecosystem of different human inhabited areas

In regards to literacy skills:
- Students should have an awareness that authors can organize or structure a text in many different ways. In longer or more complex nonfiction pieces authors sometimes use several types of structures in one text. In "Seeking Zika: Where and When Will Zika-Carrying Mosquitoes Strike Next?" the main text structure used is description, but there is also some cause/effect as well.
- Students should be aware of text features that can help them locate and learn information when reading a text. The text features in the article for this lesson include: title, subtitle, headings, a photograph, and one caption.
- Based on the writing prompt and writing rubric used with this lesson, students should be able to respond to a writing prompt in a clear, organized manner that includes use of an introduction to establish the main point(s), a body paragraph(s) that support the main point(s) and includes relevant and specific textual evidence, and a conclusion that supports the main point(s).
- Based on the writing rubric used with this lesson, students should have some awareness that use of transition words or phrases can help a piece of writing flow smoothly from one point or idea to the next. Teachers might wish to provide students with a sheet of transitions to help them. The site "Smart Words" has a list of transitions that teachers might provide.

Guiding Questions: What are the guiding questions for this lesson?
1. Why are mosquitoes a concern for human health and what are some ways scientists are hoping to control the spread of mosquito-borne disease?
   - Mosquitoes are insects that are involved in disease transmission to humans. They can transmit parasites to humans when they bite them. Mosquito-borne diseases include dengue, chikungunya virus, yellow fever, malaria, and the Zika virus. Because of the negative impact on human health, there has been much research done on the diseases themselves as well as how to stop the transmission of the disease. In an attempt to control the spread of these diseases, scientists are studying environmental and socioeconomic factors that put people at risk.
2. Why is it important to track and pinpoint the sources or potential causes of infectious outbreaks (in general, or specific to viruses)?

Teaching Phase: How will the teacher present the concept or skill to students?
1. Begin the lesson by posing a general question to the class: What is the first thing that comes to mind when I say "mosquito"?
   - Students will probably say pest, blood sucker, parasite, etc. At this point, the teacher should begin a discussion on the different relationships organisms can have with each other. The placement of the mosquito into a specific category is blurred. Some scientists place mosquitoes in the broad category of ectoparasites, while others do not characterize them as ectoparasites because they do not live on the organism and the females are the ones that bite. Remind students that the female uses the blood and its nutrients for her eggs. Both males and females feed on nectar for energy.
2. Next ask students, "How do mosquitoes transmit disease to humans?"
   - Students should be able to answer that any parasite the mosquito has when biting a human can be transferred to the human during this process.
3. Next ask students, "What can we do to prevent the spread of viruses?" (This can become a broader question if the teachers asks about pathogenic agents in general).
   - Students are likely to suggest medicines or vaccines to prevent getting the virus in the first place. They also might suggest understanding how the disease is transmitted.
4. Next ask students, "Why is it important to know about the organisms that spread the disease?"
   - They might suggest the more we know about an organism that transmits a disease, the less likely we are to get the disease by knowing and taking the necessary precautions.
5. Ask students, "How do we prevent mosquitoes from transmitting disease?"
   - Students should be able to describe ways in which we prevent mosquito bites such as: bug spray, bug nets, screened in porches, removing stagnant or still water and other various methods. Point out to students that even with all of these methods, mosquitoes still find people to bite.
6. Finally ask students to think about the question, "How can we find out about a mosquito population tied to a specific disease and prevent people from getting the disease?" Tell the students to think about this question while they are reading the assigned article.
7. End the discussion by informing students they will be reading an article that addresses the Zika virus and the mosquitoes that transmit them. Tell them they will be reading about scientists who are conducting research on the transmission of the Zika virus in three towns in coastal Ecuador. You might want to show students a map of Ecuador and point out the towns of Machala, Huaquillas, and Portovuelo/Zaruma.
Guided Practice: What activities or exercises will the students complete with teacher guidance?

1. Provide each student with a copy of the article.

2. Have students use text coding to help them identify or take notice of the following as they read the article for the first time.
   o Consider using the following text coding:
     - Z = Zika or Zika Virus
     - Aa = Aedes aegypti
     - D = disease
     - M = Mosquito
   o Explain to students whenever they come across information about the Zika virus, they can write a Z in the margin of the text. When the article references Aedes aegypti, they can write an Aa in the margin of the text. They will do this for each of the items listed (teachers can add more items or remove certain items to meet the needs of their students.)

3. Before students begin reading, direct them to pay attention to the text features of the article to help them learn and locate information:
   o Title: "Seeking Zika: Where and When Will Zika-Carrying Mosquitoes Strike Next?"
   o Subtitle: NSF-Funded Scientists Look for Answers in Coastal Ecuador
   o Headings: Mosquito Bites, Seeking Zika, and The Risk Landscape
   o Caption: Located under the opening photograph

4. Have students read and mark the text (have the text-coding items displayed for students). The teacher should monitor students as they work and provide support and guidance as needed.

5. Students should also work to discern the meaning of selected vocabulary from the text during their initial reading of the text, or if it is easier for students, after their first reading of the text. For academic vocabulary, students will likely be able to use a variety of vocabulary strategies to define the meaning of the words (for example: use of context clues, word parts, or a dictionary). For domain-specific (in other words, subject-specific) vocabulary, students will typically need to draw on prior knowledge and use a dictionary to define the words.
   o Students could use online or print dictionaries to define the following domain-specific words (teachers can add more if they wish): microcephaly, infectious disease, viruses, ecology.
     - Microcephaly: abnormal smallness of the head, a congenital condition associated with incomplete brain development.
     - Infectious disease: disorders caused by organisms such as bacteria, viruses, fungi or parasites. Many organisms live in and on our bodies. They're normally harmless or even helpful, but under certain conditions, some organisms may cause disease. Some infectious diseases can be passed from person to person.
     - Viruses: a small infectious agent that replicates only inside the living cells of other organisms. Viruses can infect all types of life forms, from animals and plants to microorganisms, including bacteria and archaea.
     - Ecology: the branch of biology that deals with the relations of organisms to one another and to their physical surroundings.
   o Students could use word parts, context clues, and/or dictionaries to define the following academic vocabulary words: transmit and socioeconomic.
     - Transmit: cause (something) to pass on from one place or person to another.
     - Socioeconomic: relating to or concerned with the interaction of social and economic factors.

6. Discuss as a class: "How do we find out enough about a mosquito population tied to a specific disease to prevent people from getting the disease?" Have students use evidence from the article to support their response.

Formative Assessment (How will teachers check for student understanding?):

1. Teachers can check students' understanding by having students share out what they text-coded in the article and the teacher can provide verbal corrective feedback, allowing students to make corrections to their work during the discussion. Students can also share out their determined meanings of the vocabulary words and receive feedback to help them correct their work.

2. For discussion on students' answers to the defined vocabulary words, teachers are encouraged to not only ask students to explain the meaning they determined for a word, but the strategy they used to arrive at that meaning. This will allow the teacher to provide alternative suggestions as to how the student could have arrived at the correct meaning of the word.

Common errors/ misconceptions to anticipate and how to respond:

1. Do all mosquitoes transmit disease?
   o It would be helpful to remind students that the mosquito, virus (bacteria, or other infectious agent) and humans are all a part of a symbiotic relationship. Just like humans, the mosquito has to get the virus from somewhere as well, this is usually another person who already has the disease. Because the virus mainly affects humans there may be no sign that the mosquito has a disease and thus we only know after they have transmitted it to someone else. You are only at risk of a mosquito-borne disease if you are within the flight distance of a mosquito and someone else who has that disease.

2. If we have bug spray and other repellents, mosquitoes can't bite us.
   o There is no permanent cure to killing mosquitoes or preventing them from biting you. We do not want to wipe out mosquitoes completely as they play a vital role in the ecosystems they belong to. With that said, we also can't keep them from biting people permanently. Bug sprays and candles are chemicals that can wear off over time, or the mosquitoes may be resistant to certain types as well. Eventually you or someone around you will be bitten, but this doesn't mean you are automatically at risk of disease.

Independent Practice: What activities or exercises will students complete to reinforce the concepts and skills developed in the
lesson?
Provide each student with a copy of the text-dependent questions to complete. Students should be reminded to continually refer back to the text and to use relevant and specific evidence from the text to support their answers.

Formative Assessment (How will teachers check for understanding?):

1. Teachers can check students' understanding by collecting students' answers to the text-dependent questions, checking their work, providing written feedback, and maybe grading the assignment. Or, teachers can have students share out their responses and the teacher can provide verbal corrective feedback, allowing students to make corrections to their work during the discussion.

2. Teachers can use the sample answer key included with the text-dependent questions to help them assess students' answers.

Common errors/misconceptions to anticipate and how to respond: Please see the answer key with the text-dependent questions and writing prompt; it addresses common errors/misconceptions with several of those items.

Closure: How will the teacher assist students in organizing the knowledge gained in the lesson?

1. Before students complete the writing prompt be sure to review responses to the text-dependent questions as a class.

2. After students' written responses have been graded and returned with feedback, teachers might wish to use the provided sample response with the class. Students who are struggling writers can benefit greatly from seeing a well-organized, detailed written response.

   - The teacher could show the sample response and discuss some of the following:
     - Point out the structure of the introduction, the use of some specifics, and where the writer reveals the main point. Connect the main point back to the writing prompt to help students see how this writer's response is answering what was asked of them.
     - Have students identify use of specific evidence from the text, particularly in paragraph two and three, that the writer uses to support the main point.
     - Have students identify correct use of science vocabulary or science terms within the written response (e.g., transmission/transmitting disease, vector, obligate parasite, host cells, microcephaly, Guillain-Barre Syndrome).

3. Science closure: At the very end of the lesson, teachers might wish to provide the two guiding questions for this lesson to students and have them respond in writing as part of an exit ticket. Students can use evidence from the article to support their response.

   - Why are mosquitoes a concern for human health and what are some ways scientists are hoping to control the spread of mosquito-borne disease?
   - Why is it important to track and pinpoint the sources or potential causes of infectious outbreaks (in general, or specific to viruses)?

Summative Assessment

1. Students will individually respond to the writing prompt. They should be directed to respond with a multi-paragraph response, with a clear introduction, body section, and a conclusion or concluding statement. They can refer back to the text as they construct their response.

2. Provide students with a copy of the writing rubric and go over the rubric with them so they will know how their written response will be assessed.

3. Go over the writing prompt with students and make sure they understand what the prompt is asking them to address.

   - The prompt: There are many different types of relationships between organisms. These relationships can include mutualism, parasitism, commensalism, predation, etc. Using evidence from the text, explain the relationship between the Zika virus, mosquitoes and humans.

4. Teachers will use the rubric to assess students' written responses.

Formative Assessment

Specific suggestions for conducting Formative Assessment can be found in the Guided Practice and Independent Practice phases of the lesson where it says, “How will you check for student understanding?”

Feedback to Students

Specific suggestions for providing Feedback to Students can be found in the Guided Practice and Independent Practice phases of the lesson where it says, “Common errors/misconceptions to anticipate and how to respond.”

Accommodations & Recommendations

Accommodations:

1. The YouTube video “The Devastating Zika Virus Explained” (approximately 3:30 minutes in length) by Discovery News offers a discussion and visualization on the Zika virus, where it is, and what the effects of it are.

2. The YouTube video “Why are Mosquitoes so Good at Carrying Disease?” by Discovery News (approximately 4 minutes in length) offers information about mosquitoes and how they transmit disease.

3. For struggling readers:
4. For struggling writers: It might help struggling writers to provide them with an outline to help them structure their written response for the summative assessment. The outline might include places for them to record:

- Introduction paragraph:
  - Ideas on how to introduce the topic
  - A few specifics from the text they might want to use to support or explain the topic
  - A place to write down their main point(s)
- Body paragraphs:
  - Topic sentence (the first sentence of each body paragraph that will reveal the point of the paragraph and will connect to the paper's overall main point)
  - Specific evidence from the text for support in each body paragraph
  - Ideas for transition words
  - Ideas for use of selected domain-specific vocabulary
- Conclusion:
  - Ideas on how to wrap up their piece and connect back to the main point(s)

**Extensions:**

1. The Centers for Disease Control and Prevention (CDC) has a [page on the Zika Virus](https://www.cdc.gov/zika/) and it offers a variety of topics that discuss the Zika virus in almost all aspects. Teachers might wish to assign a specific topic to the students after reading “Seeking Zika: Where and When will Zika-Carrying Mosquitoes Strike Next?” There are links on the CDC Zika Virus page where students can further explore the guiding questions, the teaching phase questions, the text-dependent questions, and the writing prompt.

2. This [link](https://www.cdc.gov) provides some information on other common mosquito-borne diseases. The teacher may wish to have students compare the Zika virus to one of the other diseases described on this page.

**Suggested Technology:** Document Camera, Internet Connection, LCD Projector, Overhead Projector, Speakers/Headphones

**Further Recommendations:**

For teachers who would like more support in understanding and implementing Reading Standards for Literacy in Science and Technical Subjects into their science curriculum, please see the teacher tutorials featured in the section of this lesson's CPALMS resource page labeled “Attached Resources.”

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**Additional Information/Instructions**

By Author/Submitter

The text's grade band recommendation reflects the shifts inherent in the Florida Standards and is based on a text complexity analysis of a quantitative measure, qualitative rubric, and reader and task considerations.

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**Source and Access Information**

Contributed by: Ryan Sirak  
Name of Author/Source: Ryan Sirak  
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**Aligned Standards**

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<th>Description</th>
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<tr>
<td>LAFS.910.RST.1.1:</td>
<td>Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</td>
</tr>
<tr>
<td>LAFS.910.RST.2.4:</td>
<td>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.</td>
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| LAFS.910.RST.4.10:            | By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.  
  a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding
LAFS.910.WHST.1.2:

- Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
- Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
- Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

LAFS.910.WHST.3.9:

- Draw evidence from informational texts to support analysis, reflection, and research.

SC.912.L.14.6:

- Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.

SC.912.L.17.6:

- Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

SC.912.L.17.13:

- Discuss the need for adequate monitoring of environmental parameters when making policy decisions.

### Related Resources

#### Tutorials

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<tr>
<td>Infectious Evidence:</td>
<td>Click “View Site” to open a full-screen version. This tutorial is designed to help secondary science teachers learn how to integrate literacy skills within their science curriculum. This tutorial focuses on using specific textual evidence to support students' responses as they analyze science texts. The focus on literacy across content areas is designed to help students independently build knowledge in different disciplines through reading and writing.</td>
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<tr>
<td>Words in the Wild: Vocabulary Strategies:</td>
<td>Click “View Site” to open a full-screen version. This tutorial is designed to help secondary science teachers learn how to integrate literacy skills into their science curriculum. This tutorial will demonstrate a number of strategies teachers can impart to students to help them use context clues to determine the meaning of unfamiliar words within science texts. It will also help them teach students how to select the appropriate definition from reference materials. The focus on literacy across content areas is intended to help foster students' reading, writing, and thinking skills in multiple disciplines.</td>
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