
Lesson Plan: The Matrix - A Vaccination Research Project

Overview and Purpose: The purpose of this lesson is to teach students health and science topics using a relevant and meaningful medium: diseases and vaccines. This lesson involves a motivating opening activity that simulates how easily diseases spread and the importance of vaccinations. Students explore vaccines through independent research and partner interaction.

Grade Level: Grades 5-8

Estimated Time Allotment: 4 Class Periods

(based on 50-minute class periods, with 45 minutes of instructional time for this lesson; specific durations of activities are provided within the Lesson Procedures section)

Curriculum Focus: Science and Health

Learning Objectives

The student will be able to:

- describe how disease spreads
- explain how vaccines work
- list types of vaccines
- discuss the benefits of vaccination
- describe the diseases that various vaccines prevent
- summarize when vaccination should occur
- use print and online resources to collect and analyze information
- determine relevant and irrelevant information
- summarize and organize information
- write about their research

Standards Addressed

Health

American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) and American Association for Health Education (AAHE), National Health Education Standards

Health Education Standard 1: Students will comprehend concepts related to health promotion and disease prevention

1.5.4 (3-5) Describe ways to prevent common childhood injuries and health problems

1.8.5. (6-8) Describe ways to reduce or prevent injuries and other adolescent health problems

Health Education Standard 3: Students will demonstrate the ability to access valid information and products and services to

3.5.2 (3-5) Locate resources from home, school and community that provide valid health information

3.8.2. (6-8) Access valid health information from home, school, and community

Lesson Plan: The Matrix - A Vaccination Research Project

Health Education Standard 8: Students will demonstrate the ability to advocate for personal, family and community health

8.5.1 (3-5) Express opinions and give accurate information about health issues

Mid-Continent Research for Education and Learning (McREL) Standards, Curriculum Standards for Health

Content Standard 7: Knows how to maintain and promote personal health

Level III (Grades 6-8) Benchmark 2. Knows how positive health practices and appropriate health care can help to reduce health risks (e.g., good personal hygiene, health screenings, self-examinations)

Content Standard 8: Knows essential concepts about the prevention and control of disease

Level II (Grades 3-5) Benchmark 1. Knows ways in which a person can prevent or reduce the risk of disease and disability

Science

National Science Education Standards, Science Content Standards

Content Standard C (Life Science): As a result of their activities in grades 5-8, all students should develop understanding of the structure and function in living systems

Curriculum Integrations

Reading

Reading and Language Arts, International Reading Association and National Council of Teachers of English Standards, Standards for the English Language Arts

3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

4: Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes

5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes

6: Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts

7: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience

8: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

11: Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities

12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Lesson Plan: The Matrix - A Vaccination Research Project

Social Studies

Social Studies, Center for Civic Education, National Standards for Civics and Government

Content Standard K-12, V: What are the Roles of the Citizen in American Democracy? What are important responsibilities of Americans?

Social Studies, National Center for History in Schools

Historical Thinking Content Standard 3: Historical Analysis and Interpretation

C. Analyze cause-and-effect relationships and multiple causation, including the importance of the individual and the influence of ideas

Lesson Procedures for Teacher

Before teaching the Lesson

Teacher Background: Content Background and Resources, Lesson Vocabulary, Instructional Strategy Overview, Preventable Disease List, The Matrix samples and The Important Book about Vaccines sample. (Teacher Resources 1 - 9)

Teacher Preparation:

Materials and Planning Notes

Prepare to have the students conduct Internet research. Bookmark websites for students to research and test websites and links to be sure that the sites are not blocked or URLs have not changed. (Teacher Resource 1)

Prepare Spread of Disease Simulation Experiment: brown paper bags filled with Hot Tamales for each student, one brown paper bag filled with a mixture of red candy (Hot Tamales and another small red candy)

Prepare copies of The Matrix (Student Resource 1), one per student and The Important Book (Student Resource 2), one per student

Additional Materials: computers with Internet access, paper bags for each student (12 oz. brown or another dark color will work best), Hot Tamales Candy (enough to place approximately 2 cups in each bag), bag of another kind of small red candy such as Tic Tacs, Red Hots, or regular M&Ms with the red M&Ms separated out (you will need enough to place a handful of this kind of candy into ONE of the bags), The Important Book by Margaret Wise Brown

Please note: Prior to starting the lesson, please check with school policy to determine if students are permitted to eat the leftover candy before giving any to the students.

During teaching of the Lesson

Lesson Plan: The Matrix - A Vaccination Research Project

Opening Activity – Spread of Disease Simulation

45 minutes

1. Introduce the topic of disease by leading a small group discussion. Ask the students to imagine that in a group the size of their class, one person has a contagious disease such as chickenpox, polio, or measles. Ask students to make predictions about the spread of the disease. (If this disease is spread through contact, how many people in the group may get the disease?)
2. Explain to students that they will be participating in a simulation of the spread of an infectious disease. Explain the experiment: each student will receive a brown paper bag. That bag represents a person (be sure to refer to the bag as the sick or infected person -- not the student -- this will help to keep the context of the experiment appropriate). Inside of the bag there are some items (candy), which represent the “bag’s” health. Once students receive a bag, they should cover the top and not discuss the contents of the “bag’s” health with their classmates.
3. Tell students that they will have five minutes to walk around and exchange a few of their paper bag’s contents with their classmates. They must get from at least three people and give to at least three people. This should all happen without any discussion about the contents of the bags.
4. Distribute the paper bags (making sure one of the students gets the paper bag with the mixture) and give the students five minutes to exchange.
5. Ask the students to return to their seats. Before they look in the bags, have a brief discussion related to the spread of disease. Ask students if they think they would always know if a person has chickenpox or measles just by looking at them. Some students will say, “Yes, because they have a rash.” This is a good opportunity to clarify that it is likely with some diseases for people to be contagious weeks before the symptoms show. Ask students how they think that may affect a person’s ability to defend himself or herself against the spread of diseases.
6. The students will now reveal and discuss the contents of their bags.
 - Explain to students that before they began exchanging the contents of their bags, one person had a bag that was contagious with an infectious disease. *Sample Conversation with Students:* “Everyone else in the class had a healthy bag with ALL Hot Tamales candy from the start. One person had a bag with the virus mixed in. The virus was the Red Hots (or other chosen red candy). Just as with the real world, that person may or may not have known the contents of their bag, but you were asked not to discuss your bag’s health. Each person having a bag containing Red Hots (or other chosen red candy) now has a bag with the disease.”

Lesson Plan: The Matrix - A Vaccination Research Project

- How many bags in the class are infected? Have students think about the implications of this experiment (some people who exchanged with the infected bag got Red Hots Disease, some did not).
 - Have students discuss why they weren't allowed to discuss their bag's "health." (In the real world, sometimes people choose not to share that information, and there are laws in place that protect that choice. Sometimes people really don't know they are infected.) How do they feel about how quickly the disease spread with "casual contact"? What did they learn from this simulation? What did it reveal to them about precautions toward certain diseases. What can they do to protect themselves?
7. Connect the implications of this experiment with the upcoming Learning Activity. Explain to students that the most effective way to prevent many diseases is through vaccines. Ask students if they know what vaccines are and how they work. Supplement the student's background knowledge by adding to the discussion. (Teacher Resource 1) Place a Preventable Diseases List on the board, chart, or overhead projector (Teacher Resource 4). Explain to students that they will select one of these diseases and research its vaccine using The Matrix to collect information.

Learning Activity – Matrix Research Project

105 minutes

1. Explain The Matrix research method to the students using the completed sample OR model the method using the blank Matrix (Teacher Resource 5 or 6).
2. Explain the procedure for the research project to the students (write the following steps on the board or chart paper).
 - a. With teacher's help, student will choose a vaccine to research from the displayed Preventable Disease List (Teacher Resource 4). Teacher will facilitate this process to make sure all vaccines are covered. Students will pick a disease from the list, and the first step of their research is to determine which vaccine prevents the disease.
 - b. Complete Matrix to research the vaccine using three sources; one source must be the CDC (U.S. Department of Health and Human Services, Centers for Disease Control and Prevention). The other sources can be print materials provided by the teacher or the Internet (bookmarked websites or list of websites provided by the teacher) (Teacher Resource 1). Record the sources on the back of the Matrix (Student Resource 1) to use for the bibliography.
 - c. After the Matrix is complete, students will write a five paragraph research essay:
 - i. Introduction Paragraph
 - ii. Supporting Detail Paragraph One (from column one of The Matrix)
 - iii. Supporting Detail Paragraph Two (from column two of The Matrix)

Lesson Plan: The Matrix - A Vaccination Research Project

- iv. Supporting Detail Paragraph Three (from column three of The Matrix)
 - v. Closing Paragraph
 - vi. Bibliography
3. Refer to the Preventable Diseases List (Teacher Resource 4) from the opening activity. Begin to facilitate the process of students choosing a disease.
 4. Students begin research and write essays.
 5. Optional: Before beginning the research, review summarizing skills, specifics of writing essays and bibliographies, working knowledge of plagiarism, and Internet safety skills.
(Please Note: This lesson plan was written based on the assumption that these topics would not be newly introduced in this lesson – for additional web resources for teaching any of these topics, please refer to the Teacher Resource 1)

Closing Activity – The Important Book Strategy

30 minutes

1. Read The Important Book by Margaret Wise Brown to the class.
2. Discuss the text structure, pattern, and writing style used by the author.
3. Explain how this text structure is helpful to summarize an important topic. The students will be using it to summarize important information they have learned about vaccines.
4. To explain the process, show students The Important Book About Vaccines sample (Teacher Resource 7 or 8).
5. Have students exchange research papers with someone who researched a different vaccine. (It is best if this takes place after the final drafts of the students' essays are completed).
6. Have students complete The Important Book About Vaccines sheet (Student Resource 2) based on the research paper they read. Provide time for students to ask the author of the paper to clarify any information.
7. Go around the room and have each student read their The Important Thing about Vaccines.
8. Collect the summaries and create a class book. Display the book in the class.

Note: The Important Book by Margaret Wise Brown is usually found in most book stores in the children's section as well as for check-out from your school or local library. If you are unable to obtain a copy of the book, use this alternative closing activity.

Alternative Closing Activity – Sum It Up

1. Have students exchange research papers with someone who researched a different vaccine. (It is best if this takes place after the final drafts of the students' essays are completed).

Lesson Plan: The Matrix - A Vaccination Research Project

2. Have students read their classmates research paper. Using a note card, have students write a top five summary based on the research paper they read. Provide time for students to ask the author of the paper to clarify any information. On the index card, the students list the top five most important pieces of information about the vaccine from the paper they read.
3. Go around the room and have each student share his or her summary.

Supplemental Materials

Resources to accompany this lesson plan have been created and are provided after this section. This lesson plan contains the following supplemental materials (as referenced throughout this section).

Student Resources

Student Resource 1: The Matrix

Student Resource 2: The Important Book About Vaccines

Teacher Resources

Teacher Resource 1: Content Background and Resources for Vaccine Education

Teacher Resource 2: Lesson Vocabulary

Teacher Resource 3: Instructional Strategy Overview

Teacher Resource 4: Preventable Disease List

Teacher Resource 5: The Matrix (completed sample)

Teacher Resource 6: The Matrix (blank)

Teacher Resource 7: The Important Book About Vaccines (completed sample)

Teacher Resource 8: The Important Book About Vaccines (blank)

Teacher Resource 9: Reference List

Modifications

- Have students work with partners or small groups to complete research. With groups of five, each student could write one section of the paper.
- Reduce the project to completing only The Matrix (not writing the paper).
- Have students turn the research paper into a presentation.
- Teach another subject using instructional strategies The Matrix or The Important Book

Assessment

- Assessment of Learning Process: Anecdotally observe students during whole group discussions and independent work.

Lesson Plan: The Matrix - A Vaccination Research Project

- Assessment of Content Knowledge: Evaluate students' written work products from this lesson (Research Essay and The Important Book About Vaccines).
- If appropriate, create a rubric for evaluating a research paper (if using a rubric, it is helpful to review it with the students before they begin to write their papers).

After teaching the Lesson

Extension and Additional Activities (Take Home Component)

- Hold a class debate about whether certain vaccinations should be required.
- Make a connection between the invention of a vaccine to prevent a disease and the Scientific Method. When scientists discover vaccines, they are following the steps of the Scientific Method. Conduct a class discussion relating the Scientific Method and the invention of vaccines.
 1. Observation and description of a phenomenon or group of phenomena
 2. Formulation of a hypothesis to explain the phenomena.
 3. Use of the hypothesis to predict the existence of other phenomena
 4. Performance of experimental tests of the predictions
- Investigate the role of the U.S. Food and Drug Administration (FDA) in approving vaccines. Most recently (Sept. 12, 2008) the FDA announced an approval of expanded uses for Gardasil to include preventing certain vaginal cancers caused by certain types of Human Papillomavirus (HPV).
- Find out when National Immunization Week is honored and plan a unit for that time
- Invite the school nurse to discuss common diseases and how they are spread. Have the school nurse discuss precautions to avoid diseases.
- Make a "class book" with Important Book handout, share with other classes and parents. Take turns taking the book home and sharing it. Have students share research papers and provide Important Book handouts for families to complete at home.

Lesson At – A– Glance

Opening: Disease Spread Simulation	45 minutes
Learning Activity: The Matrix Research Project	105 minutes
Closing: The Important Book Strategy	30 minutes

The Matrix - A Vaccination Research Project
Student Resource 1: The Matrix

Student Name: _____

Research Data Chart

We are Learning About Vaccinations...

VACCINE: _____


	What does it prevent?	How does it work?	When do you get it?	Why do you get it?
Source 1 (CDC)				
Source 2				
Source 3				


The Matrix - A Vaccination Research Project

Student Resource 2: The Important Book About Vaccines


Student Name:

Writing a Summary of Your Learning


 The important thing about _____
is _____
_____.

 _____


_____.

 _____

_____.

 _____

_____.

 The important thing about _____ is

_____.

The Matrix - A Vaccination Research Project

Teacher Resource 1: Content Background and Resources

“Disease prevention is the key to public health. It is always better to prevent a disease than to treat it. Vaccines prevent disease in the people who receive them and protect those who come into contact with unvaccinated individuals. Vaccines help prevent infectious diseases and save lives. Vaccines are responsible for the control of many infectious diseases that were once common in this country, including polio, measles, diphtheria, pertussis (whooping cough), rubella (German measles), mumps, tetanus, and Haemophilus influenzae type b (Hib).”

“Parents are constantly concerned about the health and safety of their children and take many steps to protect them. These steps range from child-proof door latches to child safety seats. In the same way, vaccines work to protect infants, children, and adults from illnesses and death caused by infectious diseases. While the US currently has record, or near record, low cases of vaccine-preventable diseases, the viruses and bacteria that cause them still exist. Even diseases that have been eliminated in this country, such as polio, are only a plane ride away. Polio, and other infectious diseases, can be passed on to people who are not protected by vaccines.”

“Vaccine-preventable diseases have a costly impact, resulting in doctor's visits, hospitalizations, and premature deaths. Sick children can also cause parents to lose time from work.”

*Statement from the US Department of Health and Human Services
Centers for Disease Control and Prevention (CDC)*

What is a vaccine?

A vaccine is made from the antigen—either a bacteria or a virus—that causes the disease. Some vaccines use live but weakened versions of the antigen. Some are made from “killed” antigens, and others are made from parts of the antigen or one that closely resembles the targeted bacteria or virus. In any form, a vaccine does not contain enough antigens to cause the disease. It has just enough to trigger the body’s immune system to produce antibodies against that disease. In most cases, these antibodies remain active and protective against the disease for a person’s lifetime. This protection is called immunity. In some cases, a vaccine requires booster shots, doses given at regular intervals.

What are some common vaccines? When do children typically get them?

Explain that usually, children receive several vaccinations during the first 10 years of their lives, most of them before the age of one: polio, MMR (measles, mumps, rubella), DTaP (diphtheria, tetanus, pertussis), Hepatitis B, Varicella (chickenpox). CDC and the American Academy of Pediatrics (AAP) recommend that pre-teens get several vaccines at their 11 or 12-year-old check-up: tetanus-diphtheria-acellular pertussis vaccine (Tdap), Meningococcal conjugate vaccine (MCV4), and human papillomavirus (HPV) vaccine for girls.

The Matrix - A Vaccination Research Project

Teacher Resource 1: Content Background and Resources

How do vaccines work? What does a vaccine do? How do vaccines prevent disease?

A weakened form of the disease germ is injected into the body. The body makes antibodies to fight these invaders. If and when the actual disease germs attack the body, the antibodies will still be there to destroy them.

What is an immune system? What is immunity?

Explain that the immune system is the body's method of protecting itself from foreign substances that invade the body. Vaccines work with our immune system to protect against diseases. A vaccine helps your body create antibodies, or cells that fight off antigens, and foreign substances like bacteria or viruses. Sometimes your body creates antibodies by itself, but not enough to fight a serious disease like polio. Immunity to a disease is achieved through the presence of antibodies to that disease in a person's system. Antibodies are proteins produced by the body to neutralize or destroy toxins or disease-carrying organisms. Antibodies are disease-specific. For example, measles antibody will protect a person who is exposed to measles disease, but will have no effect if he or she is exposed to mumps.

There are two types of immunity: active and passive. Active immunity results when exposure to a disease organism triggers the immune system to produce antibodies to that disease. Exposure to the disease organism can occur through infection with the actual disease (resulting in natural immunity), or introduction of a killed or weakened form of the disease organism through vaccination (vaccine-induced immunity). Either way, if an immune person comes into contact with that disease in the future, their immune system will recognize it and immediately produce the antibodies needed to fight it. Active immunity is long-lasting, and sometimes life-long. Passive immunity is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system. A newborn baby acquires passive immunity from its mother through the placenta. A person can also get passive immunity through antibody-containing blood products such as immune globulin, which may be given when immediate protection from a specific disease is needed. This is the major advantage to passive immunity; protection is immediate, whereas active immunity takes time (usually several weeks) to develop. However, passive immunity lasts only for a few weeks or months. Only active immunity is long-lasting.

What are the potential side effects of vaccinations?

While vaccines are very safe, like any medicine they do sometimes cause reactions. Mostly, these are mild "local" reactions (soreness or redness where the shot is given) or a low-grade fever. They may last a day or two and then go away. Sometimes more serious reactions are associated with vaccines. These are much less common. Some have been reported after vaccination but are so rare that it is impossible to tell if they were caused by the vaccine or would have happened anyway. There is a very small risk (estimated at around one in a million) that any vaccine could trigger a severe reaction.

The Matrix - A Vaccination Research Project

Teacher Resource 1: Content Background and Resources

Why should vaccinations be required?

Immunizing individual children also helps to protect the health of our community, especially those people who are not immunized. People who are not immunized include those who are too young to be vaccinated (e.g., children less than a year old cannot receive the measles vaccine but can be infected by the measles virus), those who cannot be vaccinated for medical reasons (e.g., children with leukemia), and those who cannot make an adequate response to vaccination. Also protected, therefore, are people who received a vaccine, but who have not developed immunity. In addition, people who are sick will be less likely to be exposed to disease germs that can be passed around by unvaccinated children. Immunization also slows down or stops disease outbreaks.

To explore the concept of community disease prevention, Garrett Hardin's classic essay *The Tragedy of the Commons* describes the challenges presented when societal interest conflicts with the individual's interest. Hardin notes: *"...a community free of an infectious disease because of a high vaccination rate can be viewed as a common. The very existence of this common leads to tension between the best interests of the individual and those of the community. Increased immunization rates result in significantly decreased risk for disease. Although no remaining unimmunized individual can be said to be free of risk from the infectious disease, the herd effect generated from high immunization rates significantly reduces the risk for disease for those individuals. Additional benefit is conferred on the unimmunized person because avoidance of the vaccine avoids the risk for any adverse reactions associated with the vaccine. As disease rates drop, the risks associated with the vaccine come even more to the fore, providing further incentive to avoid immunization. Thus, when an individual in this common chooses to go unimmunized, it only minimally increases the risk of illness for that individual, while conferring on that person the benefit of avoiding the risk of vaccine induced side effects. At the same time, however, this action weakens the herd effect protection for the entire community. As more and more individuals choose to do what is in their 'best' individual interest, the common eventually fails as herd immunity disappears and disease outbreaks occur. To avoid this 'tragedy of the commons', legal requirements have been imposed by communities (in recent times, by states) to mandate particular vaccinations."*

The Matrix - A Vaccination Research Project

Teacher Resource 1: Content Background and Resources

WEB RESOURCES

Content Background

www.cdc.gov/vaccines

www.cdc.gov/vaccines/vpd-vac/default.htm

<http://kidshealth.org/parent/general/body/vaccine.html>

www.vaccineinformation.org

www.neahin.org

www.who.org/

www.cdc.gov/vaccines/recs/schedules/default.htm

www.cdc.gov/vaccines/recs/schedules/child-schedule.htm#printable

www.cdc.gov/vaccines/pubs/vis/default.htm

www.cdc.gov/vaccines/recs/schedules/downloads/child/2008/08_7-18yrs_schedule_pr.pdf

www.cancer.org

Lesson Plans and Resources on Research Writing/Writing a Bibliography

www.readwritethink.org/lessons/lesson_view.asp?id=306

www.readwritethink.org/lessons/lesson_view.asp?id=419

www.teachersnetwork.org/dcs/cyberenglish/researchlp.htm

www.literacymatters.org/lessons/onlineresearch.htm

www.readwritethink.org/lessons/lesson_view.asp?id=158

Lesson Plans and Resources on Plagiarism

www.indiana.edu/~wts/wts/plagiarism.html

www.readwritethink.org/lessons/lesson_view.asp?id=1062

www.turnitin.com/research_site/e_home.html

Lesson Plans and Resources on Internet Safety

<http://bnetsavvy.org/>

www.netsmartz.org/educators.htm

www.media-awareness.ca/english/games/index.cfm

<http://ilearn.isafe.org/>

www.cybersmartcurriculum.org/home

The Matrix - A Vaccination Research Project

Teacher Resource 1: Content Background and Resources

WEB RESOURCES

Rubrics for Research Writing

<http://rubistar.4teachers.org/index.php>

www.Turnitin.com

www.teach-nology.com/web_tools/rubrics/general

www.readwritethink.org/lessons/lesson_view.asp?id=306

www.rubrics4teachers.com/archive.php

Resources for Bookmarking Websites for Students on the Internet

(How to create “bookmarks” of websites for the students’ Internet research)

<http://iKeepBookmarks.com>

<http://pagekeeper.teachingmatters.org/home>

<http://teachingtoday.glencoe.com/howtoarticles/social-bookmarking>

Suggested Websites to Bookmark for this Activity (Research Matrix for Vaccines)

<http://www.cdc.gov/vaccines/vpd-vac/default.htm>

<http://www.nih.gov>

<http://www.webmd.com>

<http://www.immunize.org/>

www.fda.gov/consumer/updates/kidsvaccines073107.html

<http://www.fda.gov/oc/opacom/kids/html/vaccines.htm>

<http://en.wikipedia.org/wiki/Vaccine>

<http://www.vaccineprotection.com/?fa=home>

http://www.who.int/ith/vaccines/2007_routine_use/en/index.html

The Matrix - A Vaccination Research Project

Teacher Resource 2: Lesson Vocabulary

antibody

Definition: A substance that fights a disease by protecting the body from a virus or bacteria.

Context: Vaccines cause the body to develop antibodies to fight a disease.

antigen

Definition: A substance such as bacteria or a virus that invades the body and stimulates the production of an antibody.

Context: Recognized as a threat by the immune system, an antigen, such as the streptococcus bacteria, triggers the production of an antibody.

bacteria

Definition: Simple one-celled organisms classified as prokaryotes.

Context: Although many bacteria live in the human body without causing harm, some cause tuberculosis, typhoid fever, whooping cough, and other diseases.

contagious

Definition: Capable of being transmitted by bodily contact with an infected person or object

Context: Measles is highly contagious, and infected people are usually contagious from about four days before their rash starts to four days afterwards.

endemic

Definition: The continual, low-level presence of disease in a community

Context: Cutaneous diphtheria is endemic in tropical countries but unusual in the United Kingdom.

herd immunity

Definition: Having a large percentage of the population vaccinated in order to prevent the spread of certain infectious diseases. Also known as community immunity.

Context: Herd immunity benefits individuals not vaccinated (such as newborns and those with chronic illnesses) because the disease has little opportunity to spread within the community.

immunization

Definition: The process of protecting the body against disease using vaccines or serums.

Context: Most children begin their immunization schedule as babies and continue before they begin elementary and middle school.

The Matrix - A Vaccination Research Project

Teacher Resource 2: Lesson Vocabulary

incubation period

Definition: The time from contact with infectious agents (bacteria or viruses) to onset of disease.

Context: The typical incubation period for measles from exposure to rash onset is approximately 10 days.

infectious

Definition: Likely to spread to others. Capable of spreading disease. Also known as communicable.

Context: Measles is an infectious disease.

vaccine

Definition: A substance that protects a body against a disease by causing the body's immune system to produce antibodies.

Context: Some vaccines provide lifelong protection against infection, while others require several doses given at regular intervals.

virus

Definition: An infectious agent that lives in a cell of another living thing.

Context: Viruses are a major cause of disease and can infect human beings with measles, influenza, and the common cold.

The Matrix - A Vaccination Research Project

Teacher Resource 3: Instructional Strategy Overview

Research Writing Matrix - Data Chart

A Matrix is a data chart students can use to collect information on an assigned research topic. This organizational tool will help students conduct research without plagiarizing. To use this strategy, introduce the research area the students will be covering and then have the students brainstorm categories of what they may want to learn about this subject. To create the matrix, students select three research categories from the brainstormed list. For each research category the student must find three sources. As they review the research from each source students take notes in the box space provided for that source. They record a few phrases that will help them remember the information. The space is too small to copy the whole passage. They can record the bibliographical information from each source on the back of the Matrix. After the chart is complete, students can begin to write their paper. Each column on the data chart can be turned into a paragraph. The students have to add the introductory and closing paragraphs, and then they will have a rough draft for a five-paragraph research essay. The Matrix is flexible; the teacher can choose the research categories or the sources. The Matrix can also be used with more than three categories or sources.

SAMPLE SCENARIO

Class is studying: Severe Weather in the U.S.

Categories Brainstormed: What is it? When does it occur? How is it predicted? Where does it occur? What is the possible damage? What can be done to prepare? What does it look like?

TOPIC: Tornadoes

	When is tornado season?	Where are tornadoes common?	What are tornadoes?
Source 1			
Source 2			
Source 3			

The Matrix - A Vaccination Research Project

Teacher Resource 4: Preventable Disease List

Anthrax
Cervical Cancer
Diphtheria
Hepatitis A
Hepatitis B
Haemophilus influenzae type b (Hib)
Human Papillomavirus (HPV)
Influenza (Flu)
Japanese Encephalitis (JE)
Lyme Disease
Measles
Meningococcal
Monkeypox
Mumps
Pertussis (Whooping Cough)
Pneumococcal
Poliomyelitis (Polio)
Rabies
Rotavirus
Rubella (German Measles)
Shingles (Herpes Zoster)
Smallpox
Tetanus (Lockjaw)
Tuberculosis
Typhoid Fever
Varicella (Chickenpox)
Yellow Fever

The Matrix - A Vaccination Research Project
Teacher Resource 5: The Matrix

Overhead Transparency
Research Data Chart
SAMPLE

We are Learning About Vaccinations...

VACCINE: *Polio Vaccine*

	What does it prevent	How does it work?	When do you get it?	Why do you get it?
Source 1 (CDC)	<i>Polio -highly contagious -spread through the air</i>	<i>- a weak form of the bacteria that causes the polio virus is injected into your body - your body produces antibodies to fight the disease - If and when you are exposed to the real bacteria, those antibodies are there to destroy the disease</i>	<i>4 doses as a child ages 2 months, 4 months, 6-18 months, and 4-6 years</i>	<i>- makes the chances of you getting polio less - improves the overall health of the community by reducing the spread of polio - if less people can get the disease, then less people can spread it</i>

The Matrix - A Vaccination Research Project
Teacher Resource 6: The Matrix (blank)

Overhead Transparency
Research Data Chart - SAMPLE


We are Learning About Vaccinations...


	What does it prevent	How does it work?	When do you get it?	Why do you get it?
Source 1 (CDC)				
Source 2				
Source 3				


The Matrix - A Vaccination Research Project

Teacher Resource 7: The Important Book About Vaccines


Overhead Transparency
Writing a Summary of Your Learning
SAMPLE

 The important thing about the Polio Vaccine is
it prevents the disease called Polio or Poliomyelitis

 When you are a child you get 4 shots of the Inactivated Polio
Vaccine (IPV)

 Before the Polio Vaccine, there were 20,000 cases of Polio in the
U.S. each year

 Polio can lead to paralysis and permanent disability

 The important thing about the Polio Vaccine is
it prevents the disease called Polio or Poliomyelitis

The Matrix - A Vaccination Research Project

Teacher Resource 8: The Important Book About Vaccines (blank)

Overhead Transparency
Writing a Summary of Your Learning
SAMPLE

 The important thing about _____ is







 The important thing about _____ is

The Matrix - A Vaccination Research Project

Teacher Resource 10 - Reference List

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