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AIDS in The Teenage Community

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Introduction

Viruses play an integral part in our life. We are losing the battle against them because they evolve at a faster rate. It is important for the scientific community to examine how these organisms evolve so they will be able to respond to the invasions of these pathogens inside of our body. Researchers in genetic engineering should work in conjunction with evolutionary biologists so they will be able to create the necessary organisms needed to fight the pathogens effectively.

Overview

The curriculum unit, entitled "AIDS in the teenage community", is intended for tenth grade students enrolled in my biology classes. My school is located in the inner city of Philadelphia and considered as a neighborhood Title I public high school. The majority of the school population consists of African American students with a small percentage of Hispanic students. The unit will serve as a supplement to the existing core curriculum. The unit on viruses will take approximately two weeks according the Philadelphia Standardized Curriculum Scheduling and Pacing Timeline for Biology. My unit will be taught in conjunction with the unit on viruses. Students will be given background information about the HIV virus and Bubonic Plague. Students are unaware of the similarities that exist between the Bubonic Plague and AIDS. Most high school textbooks do not mention the relationship and they talk about the HIV virus briefly in the chapter. The unit will expose the students to the facts about both of these diseases and the impact they had on society. Students will be introduced to how the virus was first discovered, how the virus has evolved making it more difficult to develop a cure, and the impact it has on the quality of life for individuals infected. In order to accomplish these goals it will take approximately eight days for the completion of this unit. The unit will be in alignment with the Pennsylvania Standard for Science and Technology 3.3.10 B "Chemical and Structural basis of living organisms".

Rationale

Adolescents represent one fourth of the newly diagnosed cases of HIV infection in the United States. Students need to realize the importance of using a condom if they are sexually active. Alcohol and drug use are closely linked to unprotected sex. Students who use drugs and consume alcohol have a higher rate of having unprotected sex. Stigmas are placed on individuals who are infected with the AIDS virus. Early detection is crucial for individuals who may have this virus. It is important for teachers to realize and understand privacy and confidentially laws of students infected with this virus. A science teacher has to instruct the whole child. It is incumbent for science teachers to introduce and teach the important issues regarding HIV. The disease has killed a significant percentage of the population of the world. It is my duty as an educator to address this problem head on.

Background

Identifying AIDS

Epidemics have been around for a long period of time. The Holy Bible talks about the ten plagues inflicted on Egypt in the book of Exodus. The ten plagues are found in chapters 7, 8, 9, 10 and 11. Acquired immunodeficiency syndrome (AIDS) is a condition that prevents the body from effectively fighting against disease. AIDS is considered a syndrome because the manner in which it affects people will vary. Individuals can suffer from infections caused by various microbes, cancer tumors or both [1] .These infections are considered to be opportunistic infections because they tend to take advantage of the immune system. The immune system of the patient is weakened and is susceptible to infection by several different types of pathogens [2] . AIDS was identified in 1981when gay men in New York City and California were suffering from a rare form of cancer. HIV is also referred to as the "gay cancer" because the rare form of cancer called Kaposi's sarcoma was found mainly in gay men [3] . AIDS was not officially declared an epidemic until the Centers for Disease Control identified several men suffering from *Pneumocystis carinii* pneumonia in California [4] . Pneumocystis is a form of pneumonia linked to individuals suffering from HIV infection. Pneumocystis is a lung infection that is caused by a fungus. Pneumocystis cases were unknown in the United States prior to1955 [5] . The disease AIDS was first identified in 1981 with evidence indicating that it was around long before 1981. Prior to receiving the name AIDS it was also known as the GRID Syndrome (Gay Related Immune Deficiency Syndrome). The gay community objected to the name because individuals who were not gay also were suffering from this unknown illness [6] . A man died in 1959 from an unknown illness in Africa. When the doctor examined his blood sample many years later it was discovered that he died from HIV infection [7] . The media and the scientific community were scorned when they included Haitian immigrants into the 4-H club. The 4-H club (homosexuals, heroin users, hemophiliacs and Haitians) represent the group of individuals with a higher risk for contracting the HIV virus [8] . A stigma was linked to this disease and people did not want to be associated with it.

HIV is known as a retrovirus because they violate the central dogma for genetic information. The typical genetic flow inside of a cell is DNA produces RNA. Retroviruses go in the opposite direction. Retroviruses

invade cells and alter the replication process of DNA. The flow of genetic material in a retrovirus is RNA produces a DNA equivalent then it goes back to RNA. During the replication process of DNA the virus causes the host cell to make copies of the HIV virus [9] . Dr. Robert Gallo director of the CDC and Dr. Luc Montagnier of the Louis Pasteur Institute were involved in a bitter dispute in 1983 as to who would get credit for the discovery of the HIV virus. The scientific community agreed that Dr. Montagnier discovered the HIV virus and he was awarded the Nobel Prize in 2008 [10] . The structure of the HIV particle is extremely small and a special type of microscope was required in order to see the particle. The scanning electron microscope is the only microscope used to see the HIV particle. The particle is surrounded by 72 spikes. The spikes are used to bind the virus to the surface of a special cell inside the body. The core of the virus contains three enzymes required for HIV replication. The enzymes are reverse transcriptase, integrase and protease. HIV virus contains only nine genes, three of the nine genes are used to control structural proteins of the virus. The remaining six genes are involved in the replication of the virus [11] . Once the virus has attached itself to the surface of the cell the contents of the virus merge inside of the host cell. The reverse transcriptase changes the RNA of the virus to DNA. The DNA moves into the nucleus of the host cell where it is spliced into human DNA with the help of the enzyme integrase. Once the HIV DNA integrates with the human DNA it becomes a provirus. The provirus can remain dormant inside the body. The enzyme protease is used to make mature viral cores. The mature viruses are now ready to infect other cells [12] .

Immune System

The job of the immune system is to protect the body against organisms and germs that invade the body. The major things that infect the body are viruses, bacteria, protozoa, and other multicellular organisms including fungi [13] . The blood circulates throughout the body carrying the required cells and cell products that make it possible for the immune system to properly function. We have two types of blood cells in our body: red blood cells and white blood cells. The red blood cells (erythrocytes) are responsible for the delivery of oxygen and the removal of carbon dioxide (CO_2) from our cells. The white blood cells (leukocytes) make up the defensive team within our body. We have two groups of cells in the immune system. Some cells are specific and some are non specific. The specific cells go around and attack certain foreign bodies or organisms that invade our body. The nonspecific cells are phagocytes, mast cells, eosinophils and natural killer cells [14] . Cells that are specific are lymphocytes. They recognize and attack foreign germs or organisms in our body.

Megakaryocytes form platelets inside of our body. The phagocytes attack foreign cells and bacteria by eating them. Phagocytes are divided into two groups. Macrophages are responsible for attacking viruses that lurk inside of a cell. Neutrophils tend to attack bacteria found inside of the cell. Mast cells and eosinophils attack large germs and other organisms such as protozoans and worms [15] .

Two types of Lymphocytes exist in the body. B-Lymphocytes secrete antibodies that move around in our body. The blood carries the antibodies throughout our body via the circulatory system. Antigens respond to specific antibodies. Once an antigen recognizes an antibody it informs the other cells to attack. It can be compared to a general giving the order to attack the enemy. T-Lymphocytes (T-cells) make special proteins called receptors; T-cells mature in the thymus gland. They do not release their receptors they hold them on the surface of the cell. T-cells recognize antigens and attach to the antigen. It can be compared to a general going out and capturing the enemy. Humans have two major types of T-cells inside the body, cytotoxic also known as killer T-cells (^{T} killer) and helper T-cells (^{T} helper). Killer T-cells attach themselves to the antigens and launch an attack that eventually kills the cells. Helper T-cells do not kill the antigens they interact with both the B-Lymphocytes and the ^{T} Killer cells and help them respond to the antigens. ^{T} Killer cells contain the

protein CD8 and T helper cells contain CD4 protein [16] . Tests have been designed to identify these cells in the body. Individuals with full blown AIDS have a T-cell count of 200 cells per milliliter or less in their body

AIDS in the Spotlight

AIDS did not come into view until the death the actor Rock Hudson in 1985. Rock Hudson had contracted AIDS because of his homosexual activity. A young child named Ryan White had contracted AIDS as a result of a blood transfusion. He was not allowed to attend his elementary school. The public was outraged because this little boy was not allowed to attend school. Ryan White died from AIDS related complications. A bill was passed by Congress called the Ryan White Bill. The bill allowed the federal government to allocate money for the care of people infected with HIV. People had been dying from AIDS related illness for years and finally in 1987 President Reagan used the term AIDS in a speech when he addressed the nation [17] . People were able to put a face with the disease. AIDS has claimed the lives of many people in the entertainment world and the fashion community.

Transmission & Detection

HIV has been found in the following bodily fluids: blood, tears, semen, saliva, urine, vaginal secretions, cerebrospinal fluid, breast milk, mucous membranes and amniotic fluid. At first, individuals infected with the virus will not show any noticeable symptoms. It will take the antibodies 6-12 weeks after the initial infection has occurred to develop symptoms [18] . Although an individual is infected with the virus they will still test negative because a sufficient amount of antibodies have not developed within the body to be detected by standard tests. HIV can be detected in the blood using an enzyme-linked immunosorbent assay (ELISA or EIA) test. A positive reading for the ELISA test indicates that the person is still able to transmit the virus to another individual. The length of time it takes for an individual to get AIDS depends on many different factors. Three major mechanisms surround the transmission of the HIV to the public. They include sexual activity, direct contact with infectious blood, and the transmission from an infected mother to an infant. Sexual activity transmission can result from either heterosexual or homosexual activity. Infectious blood transmission can be a direct result of needle sharing in IV drug users, blood transfusion and blood products. Infected mothers can transmit the virus in utero, at birth or through breast feeding [19] .

HIV-1 and HIV-2

Two types of HIV viruses that exist are HIV-1 and HIV-2. SIV-1 is the virus found in chimps. The SIV virus found in chimps is closely related to the HIV virus. The SIV virus evolved into the HIV virus and jumped into the human population over time. Scientists would like to study the chimpanzee however this is not feasible. Chimpanzees are on the endangered list and pressures from organizations like PETA make them unlikely candidates for experimentation [20] . HIV-1 infection is the major HIV virus found in the United States, and both HIV-1 and HIV-2 are found in Sub-Saharan African countries. The HIV-2 virus is a less deadly virus and it is closely related to the virus found in monkeys. The two viruses may have evolved from one common ancestor many years ago. The virus jumped from monkeys to humans over a period of time. The test used to detect HIV-1 will not work for HIV-2 Doctors have not developed a series of drugs to treat HIV-2. HIV cocktails have been nonresponsive to the HIV-2 [21] .

Myths versus Facts

There are many stories floating around describing the origin of the AIDS virus. The myths range from the germ

warfare to sex with animals. Although these stories lack any merit and are completely false they are topics for discussion in the general public. The epidemic has grown at a disproportional rate among minorities. African Americans represent only 12% of the population in the United States however they account for half of the AIDS diagnoses in 2005 [22] . Sixty million people have contracted the AIDS virus; twenty million people have died from AIDS related complications. Projected figures indicate that ninety million people will have HIV virus infection by 2020. The number of African American adults and adolescents diagnosed with AIDS per 100,000 was 10 times higher when compared to Caucasians. The AIDS case rate for African American men was 95.1cases per 100,000 and 45.5 per 100,000 1}for African American women. The case rate for African American men and women represent the largest rate for any group. The case rate for Caucasian men was only 12.1% per 100,000 [23] . The death rate was higher in African Americans and the survival rate is lower in African Americans when compared to other racial and ethnic groups. Nine states have been identified for having the largest number of African American individuals living with AIDS. AIDS cases were the highest in eastern states. Aids case rates per100, 000 was higher in eastern states. The identified states are New York with the largest number of cases 33,924, Florida (22,232), Texas (11,307), Georgia (11, 255), Maryland (11,113), California (10,947), New Jersey (9,511), Pennsylvania (8488), Illinois (8,042). The nine states identified have the largest newly diagnosed cases [24] . Sub-Saharan Africa represents the largest number of people living with AIDS. The large number is due to several factors. Civil Wars are occurring in many of these countries. Women and men are having unprotected sex. The reasons range from young girls being raped by the soldiers to women prostituting themselves in order to make money. Everyday approximately 5700 people die from AIDS and every fifteen seconds another young adult between the ages of 15-24 has become infected with this deadly disease. The number of women infected with this virus has tripled over the last twenty years [16] . There are several factors that have caused this problem to escalate in our society. More women became involved in the drug culture and many women were having unprotected sex. The CDC indicated that approximately 39% of sexually active high school students do not use condoms. A study conducted by CDC illustrated the fact that a higher prevalence of STD's occurred in African American youth. Individuals who have an STD engaging in unprotected sex with an HIV positive person are five times more likely to contract HIV [25] . The largest numbers of AIDS cases exist in Sub-Saharan Africa. The reason for the large numbers of AIDS cases in Africa is largely due to individuals having unprotected sex.

Behavior

Teenagers are in the process of discovering their own sexuality. They are prone to use alcohol and drugs. Teenagers are more likely to engage in unprotected sex when they are under the influence of alcohol and drugs. The CDC conducted a study in 2007 which indicated that 23% of high school students who had sexual intercourse during a three month period had in fact drunk alcohol or used drugs [26] . Teenagers do not think about their mortality. They are not able to make the connection between risky behavior and contracting STDs. The major things that tend to influence the behavior of teenagers are what I consider the two P's (parents and peers). Teens are easily influenced by other teens to engage in behavior that would put them at risk. Teens with low self esteem tend to do things because they want to be accepted by their peers. Parents spend the majority of the day working and taking care of the household. A study was conducted by Walter Vaughn in 1993 at several urban high schools. The target group was high school students in an urban high school. The objective of the study was to determine the effectiveness of a teacher delivered curriculum aimed at increasing a students' knowledge about AIDS and the reduction of AIDS related risk behaviors. The three month study indicated favorable results were observed with the high school students. Students learned more about the disease, the self esteem of the students increased and there was reduction in risky sexual behavior [27] Risky behavior can serve as a death sentence for a teenager. Young adults have to be able to make

intelligent decisions about the actions they take.

Treatment

Many drugs are used in the treatment of AIDS. The first drug used was Azidothymidine (AZT). Retroviruses mutate at a higher rate making it difficult for HIV patients to respond successfully to drug therapy. They build up a resistance to AZT. Zalcitabine and Didanosome were used as single treatments. During the replication process the HIV virus readily mutates, making many different copies of itself within an infected cell. Thus, an HIV virus population easily forms mutants which can be resistant to single drug treatment. "The understanding of HIV replication and the importance of Evolutionary Biology are essential in the development of antiviral drug resistance. Knowledge about this relationship led to the development of triple-drug combinations" [28]

Bubonic Plague

Bubonic Plague also known as the "Black Death" and "Pestilence" attacked Europe during the Middle Ages (1347-1352). It was called the Black Death because it left black sores on the body of the individual infected with the disease. The plague killed roughly forty percent of the population (28 million people) in Europe during the Middle Ages. Bubonic Plague was caused by bacterium Yersinia pestis. Rats are the carriers of the bubonic plague and are the secondary host and fleas are the primary host. It was very dirty in Europe during this time. Sanitation was a very serious problem in Europe due to the population explosion in the cities. Farming was a major way of providing food along with the domestication of animals. Animals played a large part in spreading diseases in a population. The rodent population began to increase when the population increased. Bubonic plague traveled around Europe because ships transported goods and people. The rats caught a ride on the ship as stowaways. The demand for goods increased during the time prior to the plague. Bubonic Plague is an arthropod vectored disease. Bubonic Plague spreads from rodents to humans. Humans serve as the secondary hosts in the transfer of this disease [29] .The site where the flea bite occurs begin to swell up causing pain. The skin develops black buboes and the victim develops fever, chills, headache, nausea, and rapid heartbeats. Death occurs very fast usually within a matter of three days.

Some scientists believe that the majority of individuals infected with Bubonic plague probably died as a result of some viral infection, and not from the plague bacteria. Individuals who survived the plague went on to have many children. After many generations the descendants of the plague survivors passed down a mutant gene. This may explain why humans living in Northern European countries often show a rare mutation consisting of a deletion in the CCR5 gene. The deletion may have allowed survival against a virus, and thus the mutation became prevalent in Europe and was subsequently passed down from generation to generation. This deletion in the CCR5 gene also causes the descendents to be fortuitously resistant to infection by HIV [30] .

Myths about Bubonic Plague

People thought the Bubonic Plague occurred as a punishment from God. Churches offered prayers of forgiveness and burned juniper in effort to prevent the transmission of the disease. The wounds that appeared on the body after infection took place were believed to be the arrows shot by God's angels. The Black Death appears in works of several famous authors. Edgar Allen Poe wrote a poem entitled the "The Mask of the Red Death". The poem describes the coming of a deadly visitor to the masquerade party. The poem alludes to the fact that when they leave the dance they will die because the plague is all around them. The plague exists in the nursery rhyme; "Ring a ring of Rosies, Pocket full of Posies, Achoo, Achoo, All fall down" [31] . The verse is about the wearing of flowers around the neck to prevent infection from the plague. The last line indicates that

the flowers did not work because everyone died. Mother Goose dealt with the spirit of the plague 1881. It was later turned into the ancient corn spirit [32] . The Pied Piper was also a story about the Plague attacking Europe. The town was overcome by rats. The Pied Piper played the pipe and the rats followed him to the river.

Different nationalities are used as scapegoats during the time of plague infection in Europe. France blamed English invaders for the cause of the infection in their country. The Italians accused the French and the Spanish accused the Portuguese of bringing the infection into the country [33]

Economic Implications

Bubonic Plague wiped out twenty-five percent of the population at the height of infection. Trade was a major form of making money during the time of the Black Death. Merchants were heavily involved in trading furs and exchanging agricultural goods. The trade routes stopped and ships were not allowed to come into the harbor. The financial stability of several countries was destroyed.

AIDS has the same affect on our health care system. Many people are suffering from this devastating disease. A financial burden has been placed on the health care system. Many of the individuals infected with the HIV virus are coming from the low end of the financial ladder. They include IV drug users, prostitutes, children, teenagers and homosexuals. The cost of treating a person with AIDS will cost approximately $150,000 per year. Two billion dollars per year is allocated to treat individuals infected with the HIV. The money was the result of the passing of the Ryan White bill in 1990. Individuals who have insurance or money in any account must exhaust the account prior to the Ryan White Bill taking affect. Two billion dollars is a large amount of money allocated for this disease. The money used to treat HIV/AIDS patients is causing a strain on the economy. Additional money is needed because of the new infections occurring in the teenage community.

Objectives

Students will be able to identify the methods of transmission of the HIV virus. They will be able to analyze the effectiveness of safe sexual in reducing the transmission of HIV. They will be able to explain why some people have immunity for HIV in terms of the evolution of the pathogen that causes Bubonic Plague. Students will be able to make connections between HIV and Bubonic Plague using the history of the disease in the world. I want my students to be able to develop better behavior patterns concerning their sexual habits after learning the information given in this unit.

Strategies

I will be working at another high school this year. The strategies I will use will involve differentiated learning strategies. In order for me to make my unit effective I have to incorporate the different learning styles of my students. I will address visual learners using pictures of individuals infected with the HIV virus and individuals suffering from full blown AIDS. Students will be asked to write about what they see and how they feel about each picture. Students will read what they wrote about the pictures to another student in the class. They will

begin to use the Think Pair Share Technique at this time. Individuals with HIV infection appear normal however individuals with full blown AIDS will show definite signs of the disease attacking their bodies. They will be able to tell from the picture that the person is suffering from some condition. They will not be able to tell anything when they look at the picture of the HIV infected person. In this strategy students will incorporate writing skills and reading skills.

I will incorporate hands-on activities that illustrate how easy HIV is passed on from one individual to another. I will have informal discussions using speakers from the organization BEBASHI, Inc. (BEBASHI stands for Blacks Educating Blacks About Sexual Health Issues). The organization will come into schools with speakers who are infected with HIV. You can indicate your audience and they will have a young adult speaker. My students will be able to put a name with a face and the discussion will be very personal. The speaker will share with my students how they acquired HIV infection. Students will have the opportunity to ask the speaker questions

Another strategy incorporated into the lesson will include video analysis. Students will keep the following questions in mind when they observe the video. What did we see? What did we hear? and What did we learn? Students will look at a video on Infectious Diseases. The video illustrates the events that occurred during the Bubonic Plague epidemic in Europe. I will advance the video so the students will not be able to see the title. Students will present their analysis of the video to each other in small groups. I will follow up with a handout containing questions that relate to the video. I will incorporate graphic organizers as a way of checking for understanding. Students will use the Venn Diagram Graphic organizer when they compare AIDS and Bubonic Plague. They will have the opportunity to compare and contrast the differences between AIDS and Bubonic Plague. Students will place the Venn diagrams on the walls around the classroom. They will be given time to look at the Venn diagrams prepared by the students in the class. The chairs in the class will be placed into a circle and students will be asked to give one word from a Venn diagram they observed. When the students arrive back to their seats they will name a word present on a Venn diagram they observed. The strategy enables me the opportunity to check for understanding and make sure that every student obtained some information. Another strategy incorporated into the lesson will include video analysis. Students will look at a video on Infectious Diseases. The video illustrates the events that occurred during the Bubonic Plague epidemic in Europe. I will advance the video so the students will not be able to see the title. Students will present their analysis of the video to each other in small groups. I will follow up with a handout containing questions that relate to the video. I will incorporate graphic organizers as way of checking for understanding. Students will use the Venn Diagram Graphic Organizer when they compare AIDS and Bubonic Plague. They will have the opportunity to compare and contrast the differences between AIDS and Bubonic Plague. Students will place the Venn diagrams on the walls of the classroom. They will be given time to look at the Venn diagrams prepared by the students in the class. The chairs will be placed into a circle and students will be asked to give one word from a Venn diagram. The students will use the strategy commonly known as Text Rendering. Text Rendering allows me the opportunity to check for understanding. Video analysis is incorporated into the curriculum unit whenever students are watching a video. The video I incorporate into the lesson is entitled "2000 and Beyond, Confronting the Microbe Menace". The video illustrates the events that occurred during the Bubonic Plague epidemic in Europe. I will advance the video so the students will not be able to see the title. Students will present their analysis of the video to each other in small groups. I will follow up with a handout containing questions that relate to the video. I will have a contest in my class. Students will develop a public service announcement about HIV/AIDS. The winner of the contest will present the announcement over the PA system in the morning. Students can make posters about HIV/AIDS. The posters will be displayed in the halls of the school. Students with artistic abilities will have an opportunity to excel.

Classroom Activities

Utilizing Q & A Note-Taking Chart, K-W-L charts, Venn Diagrams, Text Rendering, Video Analysis and cooperative learning strategies such as team teaching, brainstorming and reciprocal teaching the first few days of the curriculum unit will focus on the students identifying the major characteristics of a virus and a bacterium. The main activity for this curriculum unit is for students to develop an HIV/AIDS prevention campaign Ad that will be displayed in school.

Activity 1:

The behavioral objectives for this activity include: (1) students will learn how and why organisms are placed into groups; (2) students will learn how to describe the organizing schemes of classification key.

Arrange students into groups of two. Distribute pictures of a variety of organisms, including bacteria, protists, fungi, plants and animals. Students will design a basic phylogenetic tree using the pictures. Students will justify their arrangements and copy their phylogenetic tree using words instead of pictures. Students will then use the Venn Diagram Graphic Organizer to visually illustrate the similarities and differences between the kingdoms. The homework assignment that will go in conjunction with this activity includes having the students design a new organism (Colored pencils, markers are required on all diagrams). Students will describe the new organism's structures and its respective functions, habitat, lifecycle, method of reproduction feeding behavior. They have to list organisms to which the new one is related to and give evidence for the relationship.

Activity 2:

The behavioral objectives for this activity include: (1) students will learn the similarities and differences between mitosis and meiosis, (2) students will learn the role of DNA in protein synthesis as it relates to gene expression, (3) students will learn how mutations can affect how a trait is expressed.

Students will work in groups of three. They will act out the process of DNA replication and transcription by having different groups of students represent the nucleotides involved. After students simulate the process they should diagram the steps and write a description of the roles played by individual students in the simulation.

Activity 3:

The behavioral objectives for this activity include: (1) students will be able to explain how risky behavior practices affect the rate HIV pathogens enter a population. Preparation prior to students arriving: (a) Arrange 32 clear plastic cups on a table. (b) Place 25 ml. of water into cups #1-31. Place 20 ml of water and 5 ml of clear joy dish detergent into cup #32.

Once the students arrive into class, ask each student to grab a plastic cup. The activity will simulate a person having unprotected sex. Each student will mix the contents of their cup with another person in the class making sure that they retain 25 ml. of solution. This should be done twice. Students have been informed that one person in the class was HIV positive. The test indicating a positive reading occurs when I place a drop of phenolphthalein. Phenolphthalein is an indicator for a base and Joy dish detergent serves as the base. Students will be able to visually observe how a pathogen (HIV) can easily enter a population.

Activity 4:

The behavioral objectives for this activity include: (1) students will learn the physical and psychological effects of HIV/AIDS virus; (2) students will learn how to use questions as a way of remembering information about HIV/AIDS. The students are involved in a discussion; all of the chairs are arranged in a circle. The guest speaker is from the organization, BEBASHI (Blacks Educating Blacks About Sexual Health Issues). This organization will bring a speaker approximately the same age group as the audience. BEBASHI is a local organization; however you can get in contact with an HIV/AIDS organization in your area that will provide speakers for your classroom. The speaker will share with the students how he/she became infected with HIV. The speaker will also convey to the students how HIV has changed their life. After the presentation from the speaker the students will have an opportunity to ask questions. Prior to leaving the class each student has to complete a Concept Web Graphic Organizer.

Activity 5:

The behavioral objectives for this activity include: (1) students will learn what bubonic plague is and how it was transmitted to people, (2) students will learn some possible reasons why some people developed immunity to bubonic plague, (3) students will learn the affect the plague had on the economy and the population in Europe, (4) students will learn why Bubonic Plague is compared to HIV/AIDS. Students will watch the video (2000 and Beyond, Confronting the Microbe Menace). After watching the movie, students will be divided into groups of three. Each group is given a Venn Diagram Graphic Organizer on chart paper. Each group will provide a three minute presentation about the graphic organizer they completed. Prior to leaving the classroom students will be given and exit ticket. The ticket will contain the following columns: What did I see? What did I hear? and What did I learn? In order for the student to leave the class they have to give one short answer for each question. The answers should be very brief. The exit ticket serves as a method of

checking for understanding

Activity 6:

The behavioral objectives for this activity include: (1) Students will learn how to effectively present important information commercially using a visual arts; (2) students will be able to explain risky behaviors that could lead to HIV infection. Students can work independently or within a group of three. They will brainstorm and come up with an effective campaign Ad they will display on a poster. Students will use markers and colored pencils to make their Ad on the poster. Each poster will be presented and judged by students in the class for its effectiveness.

Activity 7:

The behavioral objectives for this activity include: (1) Students will learn how to identify metaphors and similes in the poem, "The Masque of the Red Death". Students will read the poem. The entire class will be involved in Text-Rendering. Students will work in pairs; they will continue to discuss the poem with their partner. Each group will complete a Frayer Model Graphic Organizer on chart paper. They will hang up the chart paper in the classroom and it will be used for future discussion.

Activity 8:

The behavioral objectives for this activity include: (1) Students will learn the importance of service learning. The students will participate in the Annual AIDS Walk which occurs in October. The students will obtain sponsors inside and outside of the school community. Donations will be made to the AIDS association on behalf of the student upon completion of the walk along with proper documentation verification.

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22. Kaiser Family Foundation, *HIVAIDS Policy Fact Sheet July 2007*, Retrieved July, 2010 from http://www.kff.org/hivaids/upload/6089-04.pdf
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24. *Ibid.*
25. Center for Disease Control, *Healthy Youth/Sexual Risk Behaviors*, Retrieved July 2010 from http://www.cdc.gov/HealthyYouth/sexualbehaviors/index.htm
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27. Judith D. Auerbach, Christina Wypijewska, H. Keith H. Brodie, "*AIDS and Behavior*," 109.
28. Hanneke Schuitemaker, Frank Miedema, "*Immunology and Medicine*," 222.
29. Robert S. Gottfried," *The Black Death*," 106.
30. Edward A. Eckert, "*The Structure of Plagues and Pestilences in Early Modern Europe 1560-1640*," 17.
31. Charles T. Gregg, "*Plague, An Ancient Disease in the Twentieth Century, Rev. Ed*.," 22.
32. Percy B. Green, "*The History of Nursery Rhymes*," 44-50.
33. Charles T.Gregg, "*Plague, An Ancient Disease in the Twentieth Century, Revised Ed*." 22.

Annotated Bibliography

Cantwell, Alan, Jr., M.D. AIDS: *The Mystery and the Solution*. Los Angeles: Aries Rising Press, 1983.

In this book the history of the AIDS virus and how it relates to cancer are discussed in detail.

Eckert, Edward A. *The Structure of Plagues and Pestilences in Early Modern Europe, 1560-1640.* Basel: Thur AG Offsetdruck, 1996.

The author provides a good account of the events that took place in Central Europe during the Dark Ages.

Gottfried, Robert S. *The Black Death, Natural and Human Disaster in Medieval Europe*. New York: The Free Press, 1983.

The author provides background knowledge about the events that took place in Europe and gives a good account of the events taking place in Europe.

Green, Percy B. *The History of Nursery Rhymes* . London: Greening & Co., Ltd., 1899.

The author provides the various nursery rhymes and explains the correlation between them.

Gregg, Charles T. *Plague, An Ancient Disease in the Twentieth Century, Revised Ed*. Albuquerque: University of New Mexico Press, 1985.

The author provides a good account of the plagues that occurred in the US. He also talks about how pathogens are transmitted.

Hanneke Schuitemaker, Frank Miedema. *Immunology and Medicine, AIDS Pathogenesis*. Norwell: Kluwer Academic, 2000.

The author gives a large amount of information about the HIV virus from the medical point of view.

Hung Fan, Ross F. Conner, Luis P. Villarreal. *The Biology of AIDS, 2nd ed*. Boston: Jones & Barrett, 1991.

The author provides a teacher friendly book that gives a very good account of the HIV/AIDS.

Judith D. Auerbach, Christina Wypijewska, H. Keith H. Brodie. *AIDS and Behavior.* Washington, D.C.: National Academy Press, 1994.

The author provides the reader with a clear picture about the relationship between HIV/AIDS and risky behavior in individuals.

Randolph M. Nesse, M.D., and Ph.D. George C. Williams. *Why We Get Sick, The New Science Of Darwinian Medicine*. New York: Vintage Books, 1994.

The author explains how our body is designed to handle pathogens and the reasons why individuals get sick. The book is an easy read and can serve as a point of reference for health and science teachers.

Twigg, Graham. *The Black Death, a Biological Reappraisal*. London: B.T. Batsford, 1984.

The author gives an account of the plague. The author identifies the organism that causes the plague and describe how the plague could affect so many people.

Electronic Resources

Center for Disease Control. *Healthy Youth/Sexual Risk Behaviors*. (October 23, 2008), http://www.cdc.gov/HealthyYouth/sexualbehaviors/index.htm. Retrieved July, 2010).

Website operated by the government responsibilities include conducting research and reporting pathogens found in the US. Website gives facts about HIV infection and risky sexual behavior in teenagers.

Cimons, Marlene. *Los Angeles Times* (September 19, 1985), http://www.aegis.com/news/lt/1985/lt850910.htm. Retrieved July, 2010.

Website containing newspaper articles from the Los Angeles Times it also provides current information about new events pertaining to HIV/AIDS in California.

Kaiser Family Foundation. *HIV/AIDS Policy Fact Sheet* (July 2007), http://www.kff.org/hivaids/upload/6089-04.pdf . Retrieved July , 2010.

Website for the organization that provides facts and figures about AIDS in our community The fact sheets are teacher friendly and can serve as a reference sheets.

Mark Cichocki, RN. *About.com:AIDS/HIV.* (May 16, 2010), http://aids.about.com/od/newlydiagnosed/a/hivtimeline.htm. Retrieved July, 2010.

Website for newspapers, the author writes articles for the Los Angeles Times. Teachers can acquire information about the latest medical issues concerning HIV/AIDS.

Summerfield, Liane. *Eric Digest* (June 1, 1990), http://www.ericdigests.org/pre-9215/aids.htm. Retrieved July, 2010.

Website serves as a collection house for educational articles. The website is under the direction of the United States Government.

Student Resources

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http://cnnstudentnews.com

This website provides up to date events in science.

Holt Biology Interactive CD-ROM

This CD allows students to work at their own pace and review the key concepts and terms.

Holt Online Learning

This website provides a copy of the complete textbook and it provides additional learning tools and practice quizzes.

http://go.hrw.com

This website is the home page for the publisher of our textbook; it has activities and worksheets directly related to the material in the text.

Johnson, George B., Ph.D. and Raven, Peter H., *Holt* Biology, Austin: Holt, Rinehart, and Winston, 2004.

This is the recommended textbook for biology as approved by the School District of Philadelphia.

www.SciLinks

This is an online website developed by the National Science Teachers Association. It contains content specific activities and provides links to other information you can use for projects, reports, and research papers.

Appendix—Content Standards

The Pennsylvania Academic Standards for Science and Technology, which will be addressed in this curriculum, was taken directly from the Core Curriculum Standards Alignment and Educational Resource Guide for the School District of Philadelphia. They include the following:

3.3. Biological Sciences Standards (A, B, C, D)

A. Explain the structural and functional similarities and differences found among living things.

- Identify and characterize major life forms according to their placement in existing classification groups (e.g. bacteria and viruses).
- Describe organizing schemes of classification keys.

B. Describe and explain the chemical and structural basis of living organisms.

- Describe the relationship between the structure or organic molecules and the function they serve.
- Explain how cells store and use information to guide their functions.
- Identify the specialized structures and regions of the cell and the functions of each.

C. Describe how genetic information is inherited and expressed.

- Compare and contrast the function of mitosis and meiosis.
- Describe mutations' effects on a trait's expression.
- Compare random and selective breeding practices and their results (e.g. antibiotic resistant bacteria).
- Describe the role of DNA in protein synthesis as it relates to gene expression.

D. Explain the mechanisms of the theory of evolution.

- Describe the factors affecting gene frequency in a population over time and their consequences.
- Explain why natural selection can only act on inherited traits.
- Explain the role of gene recombination in changing a population of organisms.