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Unit Plan Part II Template

Unit: Biosphere

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| Objective | Possible Teaching Strategies | Final Choice | Rationale |
| Explain what ecology is | * Student directed: Students will use external resources including internet or textbooks to determine the definition of ecology * Teacher directed: Teacher will define ecology for the students * Discussion: students will share with the class their own definition of ecology | * Discussion: students will share with the class their own definition of ecology * Teacher directed: Teacher will define ecology for the students | The discussion will allow students to activate previous knowledge and initiate engagement. This discussion will also allow the teacher to assess the students and correct misconceptions by providing students with the correct definition. |
| Provide examples of biotic and abiotic factors | * Exploration: 10 stations will be set up around the class. Each station will contain either an abiotic or biotic factor. Students will determine if it is “living” or “non-living” * Teacher directed: Teacher will define abiotic and biotic factors and provide examples | * Exploration: 10 stations will be set up around the class. Each station will contain either an abiotic or biotic factor. Students will determine if it is “living” or “non-living” * Teacher directed: Teacher will define abiotic and biotic factors and provide examples | Instead of simply telling students what abiotic and biotic means, I think they would learn more if they “explored” and “discovered” the definition themselves; the station activity will allow for students to do exactly that. |
| Identify the 6 levels of organization in the biosphere and their associated components | * Teacher directed via powerpoint: Teacher will explain the six different levels of the biosphere * Question and answer between teacher and students. | * Teacher directed via powerpoint: Teacher will explain the six different levels of the biosphere * Question and answer between teacher and students. | I thought that a powerpoint filled with visuals would be the best teaching strategy for this objective. The 6 levels of organization can get confusing. Directly teaching this object may result in the lowest amount of misconceptions and allow for question and answers. |
| Apply knowledge of the levels of organizations to real world situations | * Teacher directed via powerpoint: the teacher will provide students with real world examples during the presentation * Student directed: the students will find real world examples of each level of organization through external resources (database, internet, textbook) | * Student directed: the students will find real world examples of each level of organization through external resources (database, internet, textbook) | Having student research examples will help students learn effectively. This technique gets students out of their seats and breaks up the traditional routine. Additionally, this activity engages a higher level of intelligence based upon Bloom’s Taxonomy. |
| Determine that photosynthetic organisms begin the flow of energy throughout food pyramids/webs/chains. | * Teacher directed via powerpoint: the teacher will directly explain to students how solar energy is converted into usable energy through photosynthesis | * Teacher directed via powerpoint: the teacher will directly explain to students how solar energy is converted into usable energy through photosynthesis | I thought that a powerpoint filled with visuals would be the best teaching strategy for this objective. Directly teaching this object may result in the lowest amount of misconceptions and allow for question and answers. |
| Distinguish the difference between autotrophs and heterotrophs | * Cooperative learning with groups: students will work with classmates to determine which organisms are autotrophs and heterotrophs. A list of organisms and their pictures will be generate by the instructor * Lecture: the teacher will directly explain the difference between autotrophs and heterotrophs | * Cooperative learning with groups: students will work with classmates to determine which organisms are autotrophs and heterotrophs. A list of organisms and their pictures will be generate by the instructor | I feel that the best way to learn key new vocabulary is to practice, practice, practice! Working with peers makes it more fun. Additionally, cooperative learning will help support teamwork, communication, and allows for multiple perspectives and interpretations. |
| Explain why energy transfer limits the number of individuals at different tropic levels of a food pyramid | * Analyzing a diagram: the teacher will explain how energy flows throughout the ecosystem using a food pyramid * Cooperative learning with group: students will work with classmates to research real world examples of how energy flows in food chain/food web. | * Analyzing a diagram during powerpoint lecture: the teacher will explain how energy flows throughout the ecosystem using a food pyramid | Providing examples can help build upon this concept. A diagram will help visual learners. |
| Calculate the energy transferred between trophic levels by using the 10% transfer efficiency rule | * Teacher-directed practice problems: teacher models how to do an energy transfer problem and students then independently do additional problems * Online interactive game that involves calculating energy transfer between trophic levels | * Teacher-directed practice problems: teacher models how to do an energy transfer problem and students then independently do additional problems | Modeling the calculations helps to avoid any issues or misconceptions immediately. Practice problems will allow for the teacher to assessment the student’s progress. |
| Analyze the relationship between predator and prey in food chains and food webs | * Hands-on class game: students reenact the predator-prey relationship and energy transfer by playing a class game | * Hands-on class game: students reenact the predator-prey relationship and energy transfer by playing a class game | This technique gets students out of their seats and breaks up the traditional routine. It is fun, interactive, and educational. Students will be more likely to remember how matter flows if they have an experience to remember. |
| Explain that all forms of matter flows throughout the ecosystem through cyclical patterns | * Teacher-directed powerpoint lecture | * Teacher-directed powerpoint lecture | The teacher can provide interactive examples throughout the powerpoint lecture to help visualize the processes. |
| Identify the three states of water and how they cycle throughout the biosphere | * Water cycle demonstation | * Water cycle demonstration | Students can actually visualize the three states of water through the demonstration |
| Describe how environmental pollution can affect the water cycle and explain possible solutions | * Problem-based learning: teacher poses an issue and students use the supplied materials to determine a solution to the issue * Discovery-based learning through lab experiment * Experimental modeling: the teacher models how the lab should go before having students do it on their own | * Problem-based learning: teacher poses an issue and students use the supplied materials to determine a solution to the issue * Discovery-based learning through lab experiment | Problem based learning helps to get students engaged. By changing their roles as students into professionals, students may be more likely to meet the high expectations. Laboratory experiments not only break up the daily routine but allow for students to practice their science literacy and laboratory skills. |
| Define the following processes of the water cycle: evaporations, transpirations, condensation, and precipitation | * Powerpoint; diagram | * Powerpoint; diagram | Students can visual the processes of the water cycle if given a water cycle diagram on powerpoint |
| Identify examples of consumers and producers given a food pyramid | * Powerpoint; picture | * Powerpoint; pictures | Providing examples can help build upon this concept. A diagram will help visual learners. |

Use the table below to complete part 2 of your Unit Plan Assignment.

**\*\*All objectives will be assessed in the summative exam**

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| Objective | Possible Assessment Strategies | Final Choice | Rationale |
| Explain what ecology is | * Informal assessment; listen to student’s answers as discussion occurs. Q&A session throughout the presentation. | * Informal assessment; listen to student’s answers as discussion occurs. Q&A session throughout the presentation. | The concept of ecology will be introduced on the first day of the unit. Informal (vs. formal) assessment allows for the teacher to identify misconceptions immediately before additional knowledge is built. |
| Provide examples of biotic and abiotic factors | * Observing participation in activity * Guided worksheet during living vs. nonliving activity. This assignment will be collected. | * Observing participation in activity * Guided worksheet during living vs. nonliving activity. This assignment will be collected. | Collecting the guided worksheet allows for the instructor to not only determine if the student was participating in the activity, but also allows for the instructor to evaluate each student’s “starting point” or prior knowledge. |
| Identify the 6 levels of organization in the biosphere and their associated components | * Student participation during question and answer * Students have eye contact and are not distracted * Students are taking notes | * Student participation during question and answer * Students have eye contact and are not distracted | Since this objective will be taught through a powerpoint, I felt that informal assessment during the presentation would make the most sense. |
| Apply knowledge of the levels of organizations to real world situations | * “6 levels of organization in the real world” assignment is evaluated * Student participation during informal classroom discussions | * “6 levels of organization in the real world” assignment is evaluated * Student participation during informal classroom discussions | Collecting the activity worksheet allows for the instructor to not only determine if the student was participating in the activity, but also allows for the instructor to evaluate how well the students are learning and which students are struggling. If needed, the instructor can make changes in his/her teaching strategies. |
| Determine that photosynthetic organisms begin the flow of energy throughout food pyramids/webs/chains. | * Student participation during question and answer | * Student participation during question and answer | Since this objective will be taught through a powerpoint, I felt that informal assessment during the presentation would make the most sense. |
| Distinguish the difference between autotrophs and heterotrophs | * Student participation during cooperative learning activity * Guided worksheets are evaluated | * Student participation during cooperative learning activity * Guided worksheets are evaluated | Collecting the activity worksheet allows for the instructor to not only determine if the student was participating in the activity, but also allows for the instructor to evaluate how well the students are learning and which students are struggling. If needed, the instructor can make changes in his/her teaching strategies. |
| Explain why energy transfer limits the number of individuals at different tropic levels of a food pyramid | * Student participation during informal classroom discussion | * Student participation during informal classroom discussion | Since this objective will be taught through a powerpoint, I felt that informal assessment during the presentation would make the most sense. |
| Analyze the relationship between predator and prey in food chains and food webs | * Student participation during game | * Student participation during game | Games are fun and interactive- but there often times not educational. It is important for both the instructor and the student to identify the meaning behind the game. The discussion allows for a variety of perspectives between classmates. The reflection journal may be turned in as well as a backup for those students who were unable to speak during the discussion due to time constrain and/or shyness. |
| Calculate the energy transferred between trophic levels by using the 10% transfer efficiency rule | * Student participation during question and answer * Students have eye contact and are not distracted * Students are taking notes * Students must turn in one of three sample problems before leaving class | * Students must turn in one of three sample problems before leaving class | Although students make “look” like they understand how to do the calculation, the instructor cannot truly know unless he/she sees the student’s work. With that said, I feel that collecting a sample problem before the end of class is a quick and affective assessment method. |
| Explain that all forms of matter flows throughout the ecosystem through cyclical patterns | * Question and answer during lecture | * Question and answer during lecture | The powerpoint lecture will be interactive. The teacher will prompt questions for the students to answer; this will help informally assess the students during the lecture. |
| Identify the three states of water cycle and how they cycle throughout the biosphere | * Student have eye contact during the demonstration | * Informal observation of students: student have eye contact during the demonstration | Eye contact during the demonstrations generally means that students are engaged. |
| Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | * Prelab and postlab questions evaluated * Participation during lab investigation * Data collection * Lab skills assessment | * Prelab and postlab questions evaluated * Participation during lab investigation * Data collection * Lab skills assessment | The multiple assessments throughout the lab allows not only allows for the instructor assess student’s learning, but also allows for student’s to assess their own learning and progress throughout the lab. |
| Define the following processes of the water cycle: evaporations, transpirations, condensation, and precipitation | * Question and answer during lecture | * Question and answer during lecture | The powerpoint lecture will be interactive. The teacher will prompt questions for the students to answer; this will help informally assess the students during the lecture. |
| Identify examples of consumers and producers given a food pyramid | * Question and answer during lecture | * Question and answer during lecture | The powerpoint lecture will be interactive. The teacher will prompt questions for the students to answer; this will help informally assess the students during the lecture. |

Use the table below to complete part 3 of your Unit Plan Assignment.

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| Science Laboratory Skill | Related Objective(s)? | Teaching Strategy? |
| Identify safety precautions before experimentation | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | The teacher will identify the safety precautions before the lab. The teacher will model appropriate safety procedures such as how to properly wear safety goggles. |
| Prepare simple solutions given measurements and measurement tools (beakers, graduated cylinders, exc) | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | Instructions on how to use the pH probe will be given in the student handout under the “procedure” section. |
| Adequately measure the pH of a solution given a pH meter | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | Instructions on how to use the pH probe will be given in the student handout. If students continue to struggle, the teacher will demonstrate how to use the pH meter. |

Use the table below to complete part 4 of your Unit Plan Assignment.

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| Science Literacy Skill | Related Objective(s)? | Teaching Strategy? |
| Describe and explain natural processes | Explain that all forms of matter flows throughout the ecosystem through cyclical patterns | Students will participate in an interactive game. After the game, students will discuss and reflect upon the objective via Socratic seminar. |
| Record and organize data on a table or chart | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | Students will learn to record and organize data into a table or chart through the lab experiment. The instructor will help guide students by providing an organizational table for data in the student handout of the lab. |
| Construct a graph with a title and labeled axis from acquire data | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | Students will learn to record and organize data into a table or chart through the lab experiment. The instructor will help guide students by providing an example of a graph after experimentation. |
| Construct solutions to a real world problem | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | Student-directed. Here, students will “extend” their knowledge from the lab experiment into creating a new experiment that involving finding solutions to acid rain. |

**Unit Plan Overview (Part 5)**

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| **Day** | **Objective** | **Teaching Strategy** | **Assessment Strategy** | **Notes** |
| 1 | Explain what ecology is  Provide examples of biotic and abiotic factors | Discussion, powerpoint lecture, and stations activity | Collection of station activity worksheet | Discussion should activate previous knowledge of ecology. Discussion will lead into powerpoint and activity |
| 2 | Identify the 6 levels of organization in the biosphere and their associated components  Apply knowledge of the levels of organizations to real world situations | Powerpoint lecture, student-directed research activity | Informal question and answer during powerpoint lecture | Remind students that they will have the following class period to complete the research activity |
| 3 | Apply knowledge of the levels of organizations to real world situations | Student-directed research activity | Research activity worksheet | Remind students to be prepared to present their findings next class |
| 4 | Apply knowledge of the levels of organizations to real world situations  Determine that photosynthetic organisms begin the flow of energy throughout food pyramids/webs/chains | Student-directed presentations, powerpoint lecture | Student presentations; informal question and answer during powerpoint lecture | Presentations should be informal; allow for each group to take no longer than 5 minutes |
| 5 | Distinguish the difference between autotrophs and heterotrophs  Explain why energy transfer limits the number of individuals at different tropic levels of a food pyramid  Identify examples of consumers and producers given a food pyramid  Calculate the energy transferred between trophic levels by using the 10% transfer efficiency rule | Lecture via powerpoint, practice problems | Collection of practice problems | First, lecture students via powerpoint. During the second half of class, do practice problem both as a class and independently |
| 6 | Analyze the relationship between predator and prey in food chains and food webs | Lecture via powerpoint, Interactive predator and prey game | Participation in game | Prepare all materials for game beforehand |
| 7 | Explain that all forms of matter flows throughout the ecosystem through cyclical patterns | Lecture via powerpoint | Informal question and answer during powerpoint lecture | Use interactive websites to show matter cycles |
| 8 | Identify the three states of water cycle and how they cycle throughout the biosphere  Define the following processes of the water cycle: evaporations, transpirations, condensation, and precipitation  Describe how environmental pollution can affect the water cycle and explain possible solutions through lab | Water demonstration, powerpoint, and group work | Experimental design checkpoint | Students will work with their assigned group to begin planning experiment for next class.  Gather materials for lab for the next day. |
| 9 | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab | Acid Rain Investigation Lab: Day 1 | Lab skills assessment | Prepare materials for lab for the next day. |
| 10 | Describe how environmental pollution can affect the water cycle and explain possible solutions through lab. | Acid Rain Investigation Lab: Day 2 | Hand in prelab and postlab worksheets | Let students know to study for the exam tonight; prompt that tomorrow is a review |
| 11 | All | Review day, students will have study guide given to them at the beginning of the unit, can use this day to ask questions or revisit ideas | Participation in jeopardy game | Make sure to have all power points and lay outs of lab |
| 12 | All | - | Unit Exam | Have exams ready with different forms of the exam |