Action Research Project

Abstract

Our action research project focused on kindergarten students’ knowledge and misconceptions about plant structure and their functions. Our instruction was focused on using models to help with the students’ lessons. After we gave our classroom a pre-assessment we found that students have many misconceptions about science concepts and in this case, plants structures and functions of the structures. They also had misconceptions about what models were. We taught two inquiry-based lessons using models as a strategy for aiding students understanding. Our first lesson was focused on what models are and how they are used in the science world, and the second lesson focused on plant structures and functions. After giving the post-assessment that was the same as the pre-assessment, student scores increased substantially. For the pre-assessment question 2, of the 21 students, none correctly drew and/or described all four plant parts. For our post-assessment 62% correctly drew and labeled all four plant parts that our lesson focused on. On our pre-assessment for models 25% correctly identified items as models but no one could give a description of what a model was. On the post-assessment 60% correctly identified the models and were able to provide their own definition of what a model is. We concluded that the use of models in inquiry-based lessons plans is an effective tool and should be utilized during instruction to increase students’ learning of the topic of plant structures and functions.
Action Research Proposal

This is our last semester at U of M Dearborn. We are enrolled in our science capstone course and the ‘big idea’ this semester is models and the benefits of using models in science inquiry lessons. We were required to do a research action project using models to teach two science lesson plans to a classroom. Our action research question is, “What do kindergartners know about plants structure and what they need to grow and what are some common misconceptions or area of lack of knowledge they may have?’ and also ‘What do kindergartners know about models and how can our use of models in inquiry lesson plans will impact their understanding of plant structure and what plant need to grow?’

Previous research shows that young students may have misconceptions on what plants are and also, what is necessary for plants to grow. In the article “Students’ Ideas About Plants and Plant Growth”, by Charles R. Barman, Mary Stein, Shannon McNair, and Natalie S. Barman, (2006), the authors found that although students K-2 and 3-6 could correctly identify many plants, there were misconceptions too, such as a seed being a plant and a mushroom as being a plant. Barman et al. (2006) also claim that the “characteristics that students strongly associate with plants are that they have leaves, stems, are green, and grow in the ground/soil” (p. 74). They also noted that not many of the K-2 students listed roots as a plant structure. A common misconception was ‘that potting soil holds the plant in the ground’. (p. 77). The researchers also gave the students a list and asked them if the items on the list were necessary for plants to grow. Although many of the students knew that the sun (light) and water were necessary for growth, they also had common misconceptions that fertilizer and plant food were necessary. According to their study, Barman et al. (2006) found that “Students tended to portray plants as requiring
what humans need in order to grow. For example, the ideas that plants “eat”, “drink”, and “breathe”, occurred frequently.” (p. 75).

In another article written by Patrick D. Krantz and Lloyd H. Barrow (2006), titled, “Inquiry with Seeds to Meet the Science Education Standards”, researchers looked at a “semester-long series of activities based upon a seed producing plant’s life cycle” (p. 92). Before they began this study on seeds, researchers assessed the K-6 students’ misconceptions about plants and plant growth. They listed five common misconceptions they had found including, “plants can live and grow in the dark” and “food for a plant is either fertilizer or other plants” (p. 92). They also found that when students were asked to draw plants “students frequently included roots, stems, and leaves but only a limited number included a flower” (p. 92). Students also were asked to make drawings of what things plants need to grow. Their drawings illustrated “light, water, and soil/nutrients”, but ‘less than 10% of drawing included air/carbon dioxide” (p. 92).

We also discovered during our literature review that students often had misconceptions of the function of structures even if they knew what the structures, leaves, stems, roots, sometimes flowers, are. The website, huntel.net, lists some of these functional misconceptions. For example, students often think that ‘leaves take in water’ and that ‘plants take in all substances they need to grow through their roots’. (www.huntel.net).

The data in the research by Barman et al. (2006) grouped the kindergartners in with the first and second graders while the article by Krantz and Barrow (2006) discussed studies which were done on grades K-6. Our research expands on these studies because we are focusing on only one grade level, kindergarten. We predict the number of misconceptions will be much higher than the averages given in the two previous research studies because the members of our study group are all in the lowest grade level. Another difference in our research project is that we
are going to teach two lesson plans using models and examine the knowledge of the students both before and after the lesson.

Models are common in everyday life but not everybody refers to them as such. While doing our project, students will not only learn more about plants, but they will learn more about models and how models are used in science. Students will hopefully gain some knowledge of how models are representative of something else, the target, and why they are useful in all learning.

The elementary school where we conducted our research is in the Wayne-Westland School District at Schweitzer Elementary School. There are 23 students in the classroom. Based on the cooperating teacher, the classroom is comprised of 2 African-Americans, 1 Hispanic, 2 Asians, and 18 Caucasian children. The teacher in this classroom loves to teach science but it is not taught on a daily basis. The school does not have an actual textbook for kindergarten but once a year they get a science kit. Their upcoming unit is on animals and the classroom will be receiving guppies, goldfish, snails, worms, and insects for the students to observe. The lesson is called ‘animals two by two’ and she said her students love observing the creatures. The classroom also observes eggs hatching every spring. The teacher creates her own lesson plans, making sure that she covers the Michigan’s grade level content expectations. We saw examples of some of the pictorial models used in the classroom, and she told us that she has used computer models but prefers just hands on experimentation and
observation and discussion for her classroom. Models are not a main source of her science instruction.

In order to answer our action research question, first we observed the classroom during a science lesson. The lesson we watched was on ‘what makes a rainbow’. The teacher asked the students what color they thought light was. Every answer imaginable came up, blue, yellow, white, pink, and one girl said, ‘I think all the colors of the rainbow’. A book was then read to the class, explaining that light was all colors of rainbow and rainbows were created when the light was bent. The book showed a picture of a prism and white light going in and colors coming out. It explained that the raindrops were all like tiny prism’s that separate the colors to form the rainbow. It explained everything in a way that the students could understand. Afterward there was a short discussion about what color light was and the majority of the students answered, “All colors”. They finished the lesson with a craft. They made a rainbow under a cloud, using construction paper. They were told to put the colors in the correct order and most of them did.

We then discussed the lesson topic that we will be teaching with the cooperating teacher, which was plants. She was agreeable since plants were on the Michigan’s GLCE’s (www.michigan.gov) and she had not covered them yet. We researched plants to determine what the most common misconceptions students have had in previous studies about plants to help us decide on which area we wanted to focus on. Using these published research studies to help narrow our topics and our questions, and checking with the Michigan’s GLCE’s (www.michigan.gov), we wrote our pre-assessment.

Based on our research, we found that younger group of students seemed to have misconceptions on the structures of a plant and what plants need to grow and that is where we focused our pre-assessment questions. We also asked a question about models because that is the
big idea we are trying to incorporate into our two lessons. For our pre-assessment we will read the questions to the children and give them a few minutes for each question. We will call the children up, one at a time, to interview them about their answers and to have them explain their drawing to us. If there are any blank or incomplete answers, we will ask the child to complete it as they come up individually.

Models are going to be a new concept for the students so for our first question we showed them four items and asked them if they think it is a model or not. The students circled either yes or not. We showed the students some familiar items such as a globe, some dried black beans, a hockey action figure, and a CD in a CD case. During the interview, we asked them what they think models are and why they said something was or was not a model. For our second question the students were asked to draw a plant with all its parts. During the interview, we asked them to name the parts of the plant that they drew. For our third question, there is a picture of a sprouting bean plant and the question was “What does the bean plant needs to grow big and healthy?” This was a multiple choice-type question and we read the choices out loud for them, one at a time. The ‘Great Plant Escape’ lists seven basic needs of plants. It lists, ‘room to grow, temperature, air, light, nutrients, time and water.’ (urbanext.illinois.edu) but for our question we wanted to narrow it down to the four we felt were most important for this age group and so we are not including time, room to grow, and temperature as choices but instead we added two answers that were incorrect, worms and plant food. Students were told they can circle as many choices as they want.

For our pre-assessment questions, we did not take them directly from any resource but rather used the research and what we have learned in class to come up with our own set of questions. In contrast, the research questions by Barman et al. (2006) were much more
complicated. The students in this study were shown pictures of different ‘things’ and had to identify them as plants or not. Then they were shown pictures and asked “to identify the things plants need for growth and to explain how each of the things they identified as needed for plant growth actually helps a plant grow” (p. 74). This would have been too difficult to do with kindergartners and so we decided to keep it as simple as possible, while still allowing us to get some useful information from the students.

We classified the pre-assessment answers in three categories, 1) Misconceptions or lack of knowledge 2) Partial Answer 3) Full Answer. For an answer to be categorized as a misconception, we determined the student does not know about the subject or believes something that is incorrect to be true. A partial answer would give parts of an answer but not a complete response. For example, for our third question about what a plant needs to grow, a student who circled three out of the four possible correct answers would be given credit for a partial answer. A full answer means for this same question a student circled all four possible correct answers without any incorrect answers. A copy of our assessment is available in appendix B. After collecting the data, graphing and interpreting the data, we based our inquiry lesson plans with the use of models to address the questions with the most misconceptions in conjunction with the Michigan Grade Level Content Expectation for Science for Kindergarten (www.michigan.gov) which follows.

**K-7 Standard L.OL:** Develop an understanding that plants and animals (including humans) have basic requirements for maintaining life which include the need for air, water and a source of energy. Understand that all life forms can be classified as producers, consumers, or decomposers as they are all part of a global food chain where food/energy is supplied by plants which need light to produce food/energy. Develop an understanding that plants and animals can
be classified by observable traits and physical characteristics. Understand that all living organisms are composed of cells and they exhibit cell growth and division. Understand that all plants and animals have a definite life cycle, body parts, and systems to perform specific life functions.

L.OL.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

L.OL.00.11 Identify that living things have basic needs.

After teaching our two inquiry lesson plans, we gave the students a post-assessment. We used the same questions as the pre-assessment with slight modifications. We felt our questions were formatted in a way that allowed us to measure a change in knowledge on the part of the students. The GLCEs state that students should have a basic understanding that plants have requirements for maintaining life with kindergarteners understanding that plants need air, water, food and light. During the pre-assessment, students did not know what all the plant parts were so in order to teach the basic needs of a plant, students need to know what the parts of the plants are first. Our goal was that, along with teaching the inquiry lessons plans in a more meaningful way to the students using models, students will have a marked improvement in the post-assessment, proving that teaching with models is an effective and valuable teaching pedagogy.

The results of our pre-assessment showed that kindergarten students had misconceptions about what models are, plant structures, and what plants need to survive. As we mentioned, for our first question on models, we showed the students four items and asked them to decide if they were models or not. 14 students correctly identified two of the four items and 5 identified all four but during the interview portion of this question, only one student would even guess at what a
model was, and they were incorrect. The second question on plant parts showed that students knew what a flower in a pot looked like, but they could not correctly name all four parts, naming only one or two parts. None of the students included roots in their drawing or description. The third question relating to needs of plants also showed vast misconceptions. Many students listed plant food and worms as necessary for plant survival. The major misconceptions we found were on plant structures. We also found misconceptions on models, mainly during the interview portion of that question and concluded that the students were probably guessing when they circled yes or no. Using the data below, we decided on our two lesson plans.

![Pre-Assessment graph]

**Lesson One**

Since incorporating the ‘big idea’ of models in all of our lessons was our goal of this project, our first lesson was on models. The objective of the lesson was for students to correctly identify models and accurately describe what a model is in a simple way. In addition, students were also required to construct models. Groups of students were given different real objects enclosed in a box. They students had to construct models of their objects to show to the other students. They other students then had to figure out what was in the box, based on the model
constructed. Students were asked, as individual groups, to compare and contrast the model and the object and then share with the rest of the class. The teacher used a chart on the board to write down the students ideas so that the class could see all five items and models. Students were shown four items in the extend portion lesson, and asked to identify items as models or not. Students also had to provide support for their answers. (To view the complete lesson, go to Appendix C)

**Lesson Two**

For our second lesson, the objective was for students to correctly identify the four basic plant structures and to be able to describe the function of each part. Students were asked to draw a plant. When they were finished they were told to compare their drawing to a pictorial model of a plant. Students were then given three live plants to compare, and to answer the question, “What are the parts of plants?” Students were told to notice the similarities and the differences of the three plants. After students had time to discuss the plants, each table shared with the classroom. As parts were mentioned, they were listed on the board. We watched a video about a growing seed and we then discussed each part and what their function was in the video. Students then participated in an interactive computer model of a plant which showed parts and function. Students finished with completing a plant diagram and labeling all the four parts of the plant, the roots, stems, leaves, and the flowers. The GLCE’s (www.michigan.gov) specify that kindergarten students should know that plants have basic needs for survival and this lesson would be taught before students can learn about the needs of a plant. They have to know what each part is and what it does. Even though the lesson was not on the needs of a plant, students scores showed improvement on the third question which had to do with plant survival. (To view complete lesson, go to appendix C)
Our post-assessment results showed that students improved remarkably in all of the scores. For question one on models, students went from only 5 correct answers to 12 correct answers. Students were also able to verbally describe what a model is.

For question two on plant parts, students went from zero full answers to thirteen full answers. The number of misconceptions went down to zero, meaning that students labeled at least three of the four parts that the lesson focused on.

Question three, on the basic needs of plants, was not directly taught but through the computer modeling and class discussion, it is noteworthy that students’ scores increased for
this question too. There were no misconceptions any longer and the number of students who correctly circled exactly four of the needs increased from three students to 11 students. A few of the students still circled plant food as a need but none circled worms for the post-assessment.

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>Misconception</th>
<th>Partial Answer</th>
<th>Full Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 3 Pre</td>
<td>4</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Question 3 Post</td>
<td>1</td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

Our conclusion is that the comparison of the two assessments suggests that teaching with models was effective for teaching about models. Students had some misconceptions but before the lesson students could not say what a model was, and after the lesson, they all could give a simple description. Many could correctly identify the models that were shown to them.

We found that teaching inquiry using models was also helpful in correcting misconceptions the kindergarten students’ had on plant parts and functions, as well as the secondary impact of teaching the students what plants need to survive. Because we did not specifically set out to answering our third question, the improvement on those scores (What do plants need for survival?) was exciting. It proved to us how effective the computer model was as a learning tool, and how teaching with models is effective as a teaching strategy.

For question three, although the lesson did not address it directly, the increase in the scores seems to suggest that some models are able to teach more than one concept. The computer model on plant parts is one such model. This model showed each part and what it was called and
it also gave a description of the function of each part. When each function was revealed, the needs of water, air, light, and nutrients were played over and over again. For example, student A was asked to touch a leaf after describing its function. After they gave their answer, they touched the proper part on the Smart board. When they touched it the computer would zoom in on the part and a small animation would play. The students could read along and hear, “Leaves use light, air, water and nutrients to make food for the plant”. Each part always showed a need in its function description.

We feel that our research builds on the previous studies (Barman et al., 2006; Krantz et al., 2006) and on students’ misconceptions about plants and plant structures. The percentage of students who correctly identified plant parts and basic needs would have been lower had they focused solely on kindergarteners. Our research also showed and confirmed to us that the use of models is a great way for students to learn about plant structures and function. Students were interested in the different models, and were fully engaged in all of the activities. The pictorial models, the diagram model and the computer model, along with the exploration of actual plants all contributed to students’ improvement on the assessment grades.
Resources:


Plant including trees misconceptions,

http://www.huntel.net.rsweetland/science/misconceptions/plants.html Retrieved February 20, 2011, from web

State of Michigan grade level content expectation, kindergarten.


Appendix A

Tentative Time Schedule for Action Research Project

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Approx. Time Needed to Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet with teacher to discuss unit topic</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Research topic to find misconceptions</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Observe a science lesson by cooperating teacher</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Work on pre-assessment</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Revise pre-assessment if needed</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Work on and finish research proposal</td>
<td>10 hours</td>
</tr>
<tr>
<td>Give pre-assessment</td>
<td>1 hour</td>
</tr>
<tr>
<td>Evaluate data from pre-assessment</td>
<td>2 hours</td>
</tr>
<tr>
<td>Teach lesson plan 1 after approval</td>
<td>One hour</td>
</tr>
<tr>
<td>Teach lesson plan 2 after approval</td>
<td>One hour</td>
</tr>
<tr>
<td>Give post-assessment</td>
<td>½ hour</td>
</tr>
<tr>
<td>Evaluate data from post-assessment</td>
<td>2 hours</td>
</tr>
<tr>
<td>Make final evaluation on success of lessons</td>
<td>1 hour</td>
</tr>
<tr>
<td>Complete final report</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

*both group members contributed equally*
Appendix B

Pre and Post Assessment

NAME_______________________________________

Pre-assessment questions/Post-assessment questions

1. Which of the following items are models? (Hold up each item and have children circle yes or no. During interview, ask student, why or why isn’t the item a model? What is a model?)

   A. Plastic flowers       B. Dried Black Beans
   Yes / No                Yes / No

   C. Big Plastic M&M      D. Kodak camera
   Yes / No                Yes / No

2. Draw a picture of a plant and include all of the parts. (Teacher asks child to describe the parts)

3. What does any plant need to grow big and healthy?  (Circle up to 5)

   Light       Water       Plant Food

   Soil        Worms       Air
NAME  

Post-assessment questions

1. Which of the following items are models? (During interview, ask student, why or why isn't the item a model? What is a model?)

A. Plastic Flowers  
   Yes / No

B. Dried Black Beans  
   Yes / No

C. Big Plastic M&M  
   Yes / No

D. Kodak camera  
   Yes / No

2. Draw a picture of a plant and include all of the parts. (Teacher asks child to describe the parts)

3. What does any plant need to grow big and healthy? (Circle up to 5)

   Light/Sun   Water   Plant Food from a store

   Soil/Nutrients   Worms   Air
NAME

Post-assessment questions

1. Which of the following items are models? (During interview, ask student, why or why isn't the item a model? What is a model?)
   
   A. Plastic Flowers
   Yes / No

   B. Dried Black Beans
   Yes / No

   C. Big Plastic M&M
   Yes / No

   D. Kodak camera
   Yes / No

2. Draw a picture of a plant and include all of the parts. (Teacher asks child to describe the parts)

3. What does any plant need to grow big and healthy? (Circle up to 5)

   Light/Sun
   Water
   Plant Food from a store

   Soil/Nutrients
   Worms
   Air
Parts of a Plant

flowers

leaves

stem

roots

roots

leaves

stem

flowers

© edHelper
Appendix C

Lesson Plans

Lesson Plan 1 – Science Models

Grade Level: K

Michigan’s Department of Education Objectives:
S.IA.00.13 Communicate and present findings of observations.
S.IP.00.16 Construct simple charts from data and observations.

Descriptive Objective

Students will compare and contrast a model of an object and the “real” object to come up with a definition of a “model” in terms of what it is and what it represent. Students will also identify different types of models and be able to construct models.

Materials

For each group of students you will need one object in a closed box (real plant, camera, bag of M&M, banana, and beans), play dough, scissors, construction paper, paper, crayons, pencil, chart, white board, glue, a globe, toy car, and an apple.

Engage

Have the students gather on the carpet. The teacher will hold a closed box and tells the students that there is something in this box, but she can’t show them. She then asks students if they had any ideas of finding out what is inside the box without looking. The students will probably suggest a clue about the object, a drawing, or telling them what it looks, smells, feels, or even tastes like. The teacher will then tell the students that each group will have a special box that only the group members can see what is inside. The teacher will ask the students to use the material provided to make different crafts, objects, or drawings that may help the rest of the class figure out what objects are inside the boxes. They will use objects they constructed in finding how is the object they made alike and different from the object inside the box?

Classroom Safety: Before student explore, demonstrate the proper use of the safety scissors. Tell them that they are not to eat the objects or the play dough.

Explore
With the question in mind the teacher will provide the material and make space for the activity. Students will be placed in 5 groups of 4 students. Each group will be given one real object in a closed box. Students will be asked to use the material provided on their desks to illustrate or show the rest of the class what is in the box. Remind the students that they can’t open the box and show the other groups what is in it until they have guessed right, only the group members can see the object in their box. Students are encouraged to illustrate the object in different ways. When each member of the group has completed an illustration of the object, as a group they will write or draw what is similar and different between the actual object and their illustrations. A copy of the chart is found below.

<table>
<thead>
<tr>
<th>What is the Object</th>
<th>What is the similar</th>
<th>What is different</th>
</tr>
</thead>
<tbody>
<tr>
<td>BANANA</td>
<td>Both are yellow</td>
<td>The real banana tastes good,</td>
</tr>
<tr>
<td></td>
<td>They have the same shape</td>
<td>but the play dough banana taste bad.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The banana that we draw is a lot bigger than the banana in the box</td>
</tr>
</tbody>
</table>

**Explain**

Each group will be asked to show their illustration to the rest of the class and see if the class can guess what is in their box. After each group presents their illustrations they are asked to bring their charts and sit on the carpet with their group members. The teacher will make a bigger version of the chart on her white board with room for all five objects. As a class, they will discuss the similarities and difference between their crafts and the object. Teacher will ask student what each illustration showed; in each case she will hold the illustration and the object side by side. Student will noticed that sometimes they show the color or shape or what the object is used for or the different parts of the object. The teacher will then ask if each illustration is exactly the same as the real object. For example, “will the banana play dough taste the same as the banana in the box?” The students will probably answer “no, because the play dough banana is not a “real” banana, so it will not taste the same”

The teacher will then explain that all the objects we constructed today were copies of the real object inside the box. We can also call these copies as models, and in each case, each model shows us something about the real object. The teacher will explain that there are many types of model especially in science. Today we made different models of an object for all the class to see because at first only the people in the group can see their object. Just like you, scientists make models of many things, such as volcanoes, planets, stars, and millions and millions of other
things around us; things that we can see, but most importantly things that are either too small for us to see or too and dangerous for us to explore like the “SUN”. Today, you have constructed many models, for example this huge drawing of a banana could be a bigger size model of a banana. The drawing of the monkey eating a banana also shows us what the object does or is used for, that is as food for monkeys and for us to. The teacher will ask the students what other types of model, have we constructed today.

**Extend/Apply**

The teacher will show the student four items, a globe, a real plant, a toy car, and an apple. She will ask the students “which item is a model and which is not and why you think so?” Students will explain that the plant and the apple are not models because they are real, and the globe and toy car are models. The globe is a model of the earth, and the toy car is a model of a real car. Both of these models are not made of the real things that the real earth or the real car is made of. Again, students are reminded of what a model is and what characteristic do models show about the real object.

**Evaluate**

The teacher will give each student a chart and ask them to look for models inside their homes. They are required to find four models. On the chart they will draw or write the object that the model represents and the similarities and differences between the real object and the model. A note for parents will also be given to the students. The note will include a definition of a model along with examples and clear instructions for this homework assignment.
Lesson Plan 2 - Plant Parts and Functions

Grade level: Kindergarten

Concept:
Plants all have 4 basic parts, the roots, the stem, the flower, and the leaf. Each part of the plant has a specific function that helps the plant survive.

Objectives:
Students will investigate the different structures common to most plants as well as the basic functions of the plant structures. Students will also be able to identify the plants parts on a pictorial model and computer model. Students will begin to recognize that plants have needs which are light, water, nutrients, and air.

Standard/Benchmark:
K-7 Standard L.OL: Develop an understanding that plants and animals (including humans) have basic requirements for maintaining life which include the need for air, water and a source of energy. Understand that all life forms can be classified as producers, consumers, or decomposers as they are all part of a global food chain where food/energy is supplied by plants which need light to produce food/energy. Develop an understanding that plants and animals can be classified by observable traits and physical characteristics. Understand that all living organisms are composed of cells and they exhibit cell growth and division. Understand that all plants and animals have a definite life cycle, body parts, and systems to perform specific life functions.

L.OL.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

Materials:
*The Tiny Seed*, by Eric Carle (Optional)
Pictures of plants including trees, flowers, and shrubs
Different small live plants (with flowers if possible)
Crayons
Tape
Pictorial Model-Flower puzzle worksheet
Pictorial Model-Parts of a plant worksheet

Technology: (Links on resource page)
Harcourt School Website for interactive plant activity on ‘Science up close’. Computer model of plant parts and functions.

Youtube Website for reading of ‘A Tiny Seed’, by Eric Carle

Safety Concerns:
Make sure there are no plant allergies in the classroom. Students should be told not to ever put any part of the plant in their mouth. Students should wash their hands after handling the plants.
**Engage:**
Based on their prior knowledge, students draw a picture of a plant. Display pictorial models of plants along with a diagram of a plant on the smart board or overhead and have discussion about what they know about plants. (Teacher can ask the students whether the pictures are models or not and what kind of models. Students should say picture models or something along those lines.) Teacher should encourage students to consider how their drawings and the picture of the plants compare. Teacher can tell students they are going to answer the explorable question: What makes up a plant and how can the parts be sorted?

**Explore:**
Teacher should instruct the students that they are going to answer the question of what makes up a plant and how they can classify the different parts by comparing three real plants.

Students will be given the first of three small plants for observation. Teacher should remove each plant from the pot and lay on paper towel or newspapers. Students should be told to look at the plants closely and notice the different parts of the plants.

Teacher will give students the second plant and have students compare what is similar and what is different in the first two plants. Teacher will finally give students the third plant for exploration and comparison. Students should discover that the plants may have different stem sizes, flowers, or leaf shape. If plants have flowers, students should observe that too, along with the similar structures of leaves, stems, and roots.

After students have looked at all three plants, teacher can go to each table and have the students discuss how they classified the different parts of the plant. When teacher has checked in with all tables, each can share one or two of their ideas with the rest of the classroom.

In kindergarten, some students may know the four basic parts of the plant, but not all will know them. Teacher can encourage students to share ideas about what each function of the parts may be.

**Explain:**
Teacher shows the video (or reads the book) ‘The Tiny Seed’ by Eric Carle, to students. Teacher tells students to pay attention at the end of the story. (Video has a slide show of different flowers and plants.) Teacher tells the students to pay attention to what plant parts the tiny seed grows and what helped the seed to grow.

After the video, teacher asks the students about the plant parts that grew. Students may say leaves, stems, roots, seeds, and flowers. Teacher will write all the parts mentioned on the board and if anything is missing, replay the section of the video where the seed is growing. Teacher will then ask about the pictures at the end of the video. “What were those pictures of?” Students may say flowers, trees, or plants. Teacher should ask students what do ALL plants, trees, and flowers have in common. Students may say roots, stems, leaves, and/or flowers.

Teacher will then show each plant part and ask students what they think the parts’ functions are. Teacher can prompt students to help generate ideas such as asking “What hits the leaves during
the day?” Students may say sun or water. “When you pour water into a plant, where does the water go?” “How do the plants stand up?” “Where did the seeds come from in the story?” After students share their ideas, teacher will explain the function of each part.

Flowers produce seeds and sometimes fruit.
Roots deliver water and minerals from the soil.
Stems support the plant and carries water and food from the root.
Leaves makes food for the plant with the help of the air and the sun.

(This lesson needs to be taught before the next lesson on the basic needs of plants)

**Extend and Apply:**
Teacher will go to the Hartcourt website link and have students sit in front of the Smart board. (Teacher should again ask the students whether the plant on the screen is a model or not and what kind of model) Using the computer model of a plant, teacher will touch each plant part and have students listen to the description of the parts’ functions. Then, one at a time, teacher will tell students a plant part and have the student say what its function is, and then touch the part on the screen. Example, “Gavin, your plant part is the root. What is its function?” Student will give an answer. “Touch the root on the plant.” When the screen is touched, the plants function appears and it is read out loud. By the time all students have completed a turn, each part will have been chosen approximately 4 times so there is repetition of the functions. There is also a fruit on this site that teacher can explain.

**Performance Assessment:**
Hand out the ‘Part of a Plant’ worksheet which is a pictorial model and have students fill in the blank with the words in the box at the bottom and color the plant. Check to make sure all parts are properly labeled.

Have a class discussion with teacher repeating the function of the parts, one at a time, and students volunteering answers.

**Follow Up Activity:**
Have the students glue their puzzle to a piece of paper and create a kinder ‘garden’ on the wall of the classroom. Check to make sure the plants are labeled correctly.
Parts of a Plant

roots
leaves
stem
flowers

© edHelper
Plant Puzzle
Resources

Chaiseree, K., (2011) Plants and Animals. Lessonplanspage.com


http://keep2.sjfc.edu/class/bnapoli/msti431/kmb2284/msti431/vpa/plantparts.gif


Science up Close,


You Tube, http://www.youtube.com/watch?v=YWH4bg5_Fqg&feature=related
Reflection of Learning – Sally Snider

Student Learning

When planning our lessons, we considered the students' ages and the misconceptions that were revealed on the pre-assessments. The kindergarten class students were unable to give a definition of what a model is. Students also were unable to list more than one or two of the basic parts of a plant. We decided to first do a lesson on models, and if it was effective, follow up with a lesson on plant parts and functions.

Using real items and having the students create their own models to show their classmates was the strategy for our first lesson. Students were given an item in a box and had to create the item, create a model of their item. The other tables had to look at the model and figure out what the target of the model was. This was very effective and after the lesson, the students were much more able to determine if items that we showed them were models or not. They also were introduced to some of the most common types of models, i.e. pictoral, computer, and physical models.

For the plant lesson, students were asked to draw their own pictoral model, compare their drawing to a diagram, and then they were to explore three live flowering plants and try to determine what different parts that each plant has. A computer model was used to reinforce what they discovered, and it also gave them information on the function of each of the parts, along with some knowledge of the basic needs of plants. All three models, plus the real plants, were a great way to present this lesson and the students did a wonderful job on their post-assessment.

Impact on future Learning

In the future, using the GLCEs as a guide, I will definitely incorporate models into science lessons. It does not matter what the school setting or the age of the students, using models is helpful in many ways. Not only does using models engage students they also make the lessons more meaningful. Students have something to look at and attach meaning to. If it is at all possible to use models then I will.

Personal Learning

I learned a lot from this project. Along with the validity of using models as a teaching tool to clear up student misconceptions I learned that I have to look at what I think and know about a concept. An important element to effectively presenting a lesson plan to students is my, as the teacher, own knowledge and misconceptions. I learned that many of us have our own misconceptions on varying scientific content. It is paramount to good teaching that I research common misconceptions to make sure I do not share any of them, and do a little research on the topics to decide how to best approach the topic with students.