Four kindergarten classes in an Ohio elementary school chose to study apples as a group project. Documenting the kindergartners' first experience with project work, this article discusses how the project evolved, and describes the three phases of the project—discussions of prior knowledge, fieldwork and visits from experts, and the culminating event or exhibit. Teachers' reflections on the project are included, as are photographs taken during the project. (Author/HTH)
The Apple Project

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Abstract

Four kindergarten classes in an Ohio elementary school chose to study apples as a group project. This article discusses how the project evolved, describes the three phases of the project, and provides teachers' reflections on the project. Photographs taken during the project are included.

School and Student Background Information

Manor Avenue Annex was a one-year temporary site for four kindergarten classes while the new Struthers Elementary School in Struthers, Ohio, was being constructed. The temporary site was located in the basement of a local church. The environment consisted of one large open room with no walls dividing the four class areas. This environment presented many challenges. Since there were no divisions between the classrooms, the noise level became overwhelming at times. Therefore, we created a shared daily schedule in an effort to teach louder/quieter activities simultaneously. For example, the children from all four classes engaged in project work during the same time period. There were 83 children, four certified classroom teachers, three instructional aides, one college student, and many parent volunteers.

The children attended an all-day, every-day kindergarten program. The Apple Project was their first experience with project work.

Preliminary Planning and Selection of the Topic

We teachers chose to initiate a project on apples based upon the current seasonal events. The project took place during the fall when apples are plentiful in Ohio. The children were already interested in this topic as evidenced by the numerous apples and apple treats that were being brought to school daily. There are...
several orchards located nearby, and most of the children had had prior experiences at the orchards with their families or preschools.

As we teachers began discussing the Apple Project, we brainstormed possible opportunities for hands-on investigations that met curriculum requirements. We also talked about available resources that would help the children investigate apples. At the conclusion of our discussions, we felt that "apples" was a worthwhile topic.

Phase 1

Phase 1 of a project generally includes discussions with the children in order to find out what prior experiences they have had with the topic and what they already know about the topic. We encouraged the children to represent their prior knowledge of apples through drawings, constructions, dramatic play, etc. We helped the children to generate questions to investigate and created a topic web. A letter was sent to parents explaining the project and inviting parent participation.

Activities

On average, the project work took place three times a week. All four teachers and all of the children were involved in the project work. However, not all of the children participated in every activity. The children selected activities according to interest. Furthermore, the children from the different classes intermingled with each other throughout the project. The following activities took place during Phase 1 of the Apple Project:

- Drawings representing prior experiences
- Class discussions about apples
- Sketches of apples
- Lists of descriptive words and phrases
- Creation of a topic web
- The gathering of apple-related literature

We encouraged the children to share their prior experiences with apples by engaging them in discussions about apples. We began the discussions by sharing personal experiences with apples. The children naturally started sharing their own personal experiences. The children then depicted their experiences through drawing. We transcribed the children's dictations.
The teachers transcribed the children's experiences related to apples.

The following excerpts were taken from the discussions that led us to the development of questions to investigate in Phase 2 of the project.

What is an apple?
Michelle: "It's a circle with a stem and a leaf."
Abby: "Something you can eat."
Mike: "An apple is a fruit."

How do you know that it's a fruit?
Mike: "Because it's more colorful than a vegetable and it has juice."

Do vegetables have juice?
Selma: "No."
Mike: "Well carrots have a little."

Describe an apple.
Heather: "It's red and hard."
Tina: "It's round."
June: "It has skin."
Jennifer: "It is white inside it."
April: "It grew out of a seed."
Michelle: "They change colors--red, green, and yellow."

Do you think that one individual apple changes from red to green to yellow?
Michelle: "Yes."

What is a seed?
Jeff: "Like ordinary seeds, they are in apples. But seeds are things you plant things with. If you plant a black seed from a apple, it might grow a apple tree."

Would you like to try that?
Eric: "Yes."
Jeff: "It would take a really long time, like 5 or 10 years."

What are apples used for?
George: "To eat."
Robin: "You can pack it for lunch."
June: "To make apple cider."
Matthew: "They are used to make apple sauce, apple pies."
Mindy: "Apple juice."
Adam: "Apple cake."
John: "Apple salad."
Eric: "Apple syrup."
Andrew: "For dunking and catch them with your mouth with the stem on it."
Mary: "It keeps you healthy."

Where do apples come from?
Mike: "Trees and the trees come from orchards."
Alice: "Apple farms."
Donny: "Stores like Sparkles."

*How do they get on the tree?*
Eric: "They turn into little ones that are green then they turn into big ones."
Amy: "They grow."
June: "They grow. First they grow into little buds and then they turn into apples."
Matthew: "They come from seeds."

*How do they get to the store?*
Robin: "The truck driver picks the apples, washes the apples, then puts them in a box. The truck driver drives them and gives them to the grocery shop."
Mary: "They pick them and put them in boxes and take them to the store."
Jeff: "A farmer picks them."
Lorie: "When the apples are on the trees, they can get a ladder and pick them off the tree."
Matthew: "They ride a tractor from a farm and then they go to the store."

*What colors are apples?*
Eric: "Red."
Jeff: "Green."
Mike: "Yellow."
April: "Sometimes half red and half green or half red and half yellow."
June: "Brown when they are rotten."
George: "Orange." (The teacher wanted to say that apples are not orange, but she refrained.)

*How do they taste?*
John: "Sweet."
Robin: "Juicy."
Andrew: "Sour."
Keith: "Yummy."
Roger: "Very delicious."
Abby: "Good."

*What would you like to learn about apples?*
April: "How are apples made?"
Matthew: "How long does it take to grow an apple tree?"
Joe: "How they make apple cider?"
Melissa: "Why do worms crawl in them?"
Marcy: "How do they get a juicy taste?"
Tina: "Why do they taste so good?"
Eric: "How do you make apple juice?"
Mike: "How do you take the juice out of foods?"
Abby: "How do you make candy apples?"
Carl: "How do they get up in a tree to pick them?"
June: "Why do apples change to brown when they get old?"
Jackie: "I wonder why apples taste so different?"
Amy: "How do they go to the grocery store?"
Mary: "How do they turn red?"
Kimberly: "How do they turn yellow?"
Tony: "How do they turn green?"

The children chose an apple and made still life sketches of the apples.
The children brainstormed a list of descriptive words and phrases about apples:

- different colors
- stem
- leaf
- shiny
- seeds
- juicy
- taste good
- sweet
- polka dots
- sour
- hard
- crunchy
- apple starts with A
- used to make foods
- circle shape
- oval shape
- tooth shaped
- skin
- bumpy bottom
- grows on trees

We created a topic web.
The teachers created a topic web related to apples.

We provided apple-related literature for the children to explore. The following is a list of apple-related literature for children:

Apple-related literature was displayed in the classroom.

Reflections on Phase 1

We, the four teachers, had varying levels of knowledge about the Project Approach. Two of us had been involved in a grant-funded Reggio Emilia study group for four years, and one of us was involved in the group for three years. The other had recently joined the study group. Furthermore, two of us had never experienced a project from start to finish and were nervous about "doing it right." We found the book *Young Investigators: The Project Approach in the Early Years* by Judy Harris Helm and Lilian Katz to be very helpful. It is an excellent resource for teachers who are interested in the Project Approach because it walks the reader through all the steps of a project.

We were excited about the children's interests and the questions that were generated. We also found the documentation to be useful. It was beneficial for us to read the documentation back to the children. The children were very interested in their own words. Furthermore, revisiting the discussions helped to maintain and spark the children's interests.

Phase 2

Phase 2 of a project typically includes fieldwork and visiting experts. It is also a time when teachers provide the children with resources such as relevant real objects and books. The children prepare for interviews and investigate initial questions. They represent their knowledge by observing and recording their findings, drawing, constructing models, predicting, conducting experiments, dramatizing, and discussing. A letter was also sent to parents explaining Phase 2 of the project.
A letter describing Phase 2 was sent to parents.

Activities

The following activities took place during Phase 2 of the project:

- Fruit vs. vegetable experiment
- Clay representations of apples and apple trees
- Seasonal apple tree representations
- Sink or float experiment
- Bobbing for apples
- Taste graphing
- Planting of apple seeds
- Apple prints
- Field trip to a fruit farm
- Take-home apple survey and graph
- *Apples Up on Top*, a class-made book
- Oxidation experiment
- Johnny Appleseed information
- Student resources

Fruit vs. Vegetable

During Phase 2 of the project, the following discussion took place:

Teacher: What is an apple?
Sam: It's cold.
Mike: A fruit.

Teacher: How do you know that it is a fruit?
Mike: Because it is more colorful than a vegetable and it has juice.
Selma: No.
Mike: Well carrots have a little.

From this discussion, an experiment emerged. We needed to find out what a fruit was, what a vegetable was, if fruits have juice, and if vegetables have juice.

Teacher: What is a fruit?
Mike: It has more juice than vegetables.
Matthew: It's juicy.
Eric: They are different than vegetables. They're growed from trees and vegetables are growed from plants.
Betty: They're nice to eat.
Alice: They're round.
Mike: Some are shaped like ovals like watermelon.
Teacher: What is a vegetable?
Michelle: Carrots, carrots are pointy.
Denise: Green beans.
Amy: A plant that grows under the ground.

The children chose two kinds of fruit (an apple and an orange) and two vegetables (a carrot and a potato) for our experiment.

Teacher: I have four foods. How can we see if they have juice inside? How can we get the juice out?
Eric: Smash 'em.
Amy: Squish it.
Bob: Step on it.
Bill: Use a hammer.
Charles: Throw it on the ground.
Eric: Poke a hole in it and squeeze it.

From these suggestions, the children chose three methods for extracting juice: (1) throwing the fruit or vegetable on the ground, (2) poking a hole and squeezing, (3) using a hammer. The children then tried all three methods on the apple, orange, carrot, and potato.

Results

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<td>a little juice</td>
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<tr>
<td>Apple</td>
<td>poked and squeezed</td>
<td>a lot of juice</td>
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<tr>
<td>Apple</td>
<td>hammer</td>
<td>a lot of juice</td>
</tr>
<tr>
<td>Orange</td>
<td>dropped</td>
<td>a little juice</td>
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</tr>
<tr>
<td>Carrot</td>
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<tr>
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<td>Carrot</td>
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<tr>
<td>Potato</td>
<td>hammer</td>
<td>no juice</td>
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</tbody>
</table>

Conclusions

Mike: Vegetables don't have juice.
Eric: The hammer and the carrot had a little juice.
Mike: But not as much as the fruit.

After the experiment, we looked up "fruit" and "vegetable" in our children's encyclopedias. From the encyclopedias, we learned that fruits have seeds and vegetables do not.
The children experimented with fruit and vegetables.

Clay Representations

The children made apples and apple trees out of clay.

Seasonal Apple Tree Representations

After reading The Seasons of Arnold's Apple Tree by Gail Gibbons, the children worked in groups to create representations of how an apple tree would look during each season.
The children represented how apple trees would look during the four seasons.

Sink or Float Experiment

The children conducted a sink or float experiment. The children predicted whether an apple would sink or float. They wrote their name under their predictions on the record sheet. After the children made their predictions, they put an apple in the tub of water. It appeared to sink. One of the children suggested testing a pumpkin to see if it would sink or float. The child went to the Nature Exploration Table, which was located in the classroom science center, and brought back a small pumpkin. Again the children made their predictions for the pumpkin on a separate record sheet. After the predictions were made, the children tested the pumpkin in the water and it seemed to float.

Teacher: Why do you think the pumpkin is floating and the apple is not?
Michelle: Because the pumpkin is fat and it holds up the pressure of water. The apple keeps sinking because it is too skinny.

The teacher did not feel that there was enough water in the tub to accurately show the results; therefore, she asked the children to put more water in the tub. To the children's surprise, the apple rose up from the tub and floated. The children became very excited about the change in results. Now that there was more water in the tub, the children re-tested other apples and the pumpkin. All of the apples and the pumpkin floated.

Teacher: Why is the apple that sunk before now floating?
Robin: The first time the apple sank because we did not have enough water, and the second time it floated because we added more water.
Mike: There is more water so the fruits don't reach the bottom and sink.
Jennifer: The pumpkin and all of the fruits together float, and none of them touch the bottom because all of them are fruits.
Missy: One apple is red, one is greenish, one is yellow, and one pumpkin is orange. Every color of fruits floats.

The children were so interested in the experiment that they wanted to do the experiment again the next day. One child used the Internet to find out why apples float. The child discovered that the reason that fresh apples float is because 25% of their volume is air.
The children tested whether apples and pumpkins would sink or float and recorded their predictions and results.

Bobbing for Apples

When we posed the question "What are apples used for?" one child responded by saying that they are used for dunking and that you catch them with your mouth by the stem. We decided to bob for apples in order to test his hypothesis. The children also came up with alternative ways to bob for apples. For example, Pete discovered that if you push an apple down to the bottom of the tub you could grab it with your teeth.

Taste Graphing

The children were interested in the wide variety of apples and why they tasted so different from each other. The children participated in an apple-tasting experiment. The children sampled a red apple (Red Delicious), a green apple (Granny Smith), and a yellow apple (Golden Delicious).

Teacher: How did the red Red Delicious apple taste?
Bob: I liked it.
Carol: Good.
Melissa: Yummy.
Kevin: Sweet.
Trevor: It was good and juicy.

Teacher: What did the green Granny Smith apple taste like?
April: Sour.
Alice: It was good.
Melissa: Sour, but good.
Trevor: Great.
Kimberly: I like it.
Tina: Very sour and juicy.
Bob: Sour.

Teacher: How did the yellow Golden Delicious apple taste?
Carol: I liked this apple.
April: Juicy.
Kevin: Good.
Kathy: It was good and juicy.
The children recorded which apple they liked best on a graph. As a whole, the children liked the green apple the best.

The children tasted three kinds of apples and recorded their preferences.

The children also had the opportunity to sample several other apples that were donated by the fruit farm.

Planting

The children were interested in planting apple seeds, but first we had to determine how to get the seeds out of the apple.

Teacher: How can we get the seeds out of the apple so that we can plant them?
Tom: Cut the apple.
Gabe: Pick the seeds out.
Marcy: Get them out with your nails.

The children removed apple seeds for planting.

Once the seeds were out, the teacher asked: What do we have to do to get the seeds to grow?

Adam: Let the seeds in the sun.
Selma: Plant them.
Tom: Give them water.
Roger: Soil.

The teacher found an experiment on how to plant seeds using a jar and paper towels. The children decided that they wanted to try this experiment as well as plant them in soil.
The children planted the apples seeds that they had harvested.

The teacher asked: Do you think that the seeds will grow in the paper towels?

Carl: No, because they don't grow on paper towels.
Keith: No, because they won't have sun.
Seth: Yes, because of the water.
Mary: No, it needs soil.

The children observed the seeds daily over the course of the year. This experiment was unsuccessful. The seeds did not sprout.

Apple Prints

During the reading of the folk tale The Little Red House, the teacher cut an apple in half to reveal the star made from the seeds. The teacher then put the apple in the art center in order for the children to capture the star print. The prints were then used to communicate the finding to others.

Field Trip

We set up a field trip to White House Fruit Farm. Before they went on their field trip, the children formulated questions that they wanted to ask the tour guide:

Teacher: What questions do you want to ask the tour guide at the apple farm?
Tom: Why are some apples hard and some apples soft?
Amy: Why do apples have all different names and signs on the apples?
Marcy: How do you make apple cider?
Betty: How do the apples come off the tree?
Paul: How do they grow? How do flowers grow to make apples?
Abby: How do they get to the grocery store?
June: Why do some apples grow big and some apples grow small?

The children were responsible for asking the tour guide their questions. We wrote down the children’s questions in case they forgot what they wanted to ask. We also wrote down the answers to the questions the tour guide gave them:

Children: Why are some apples hard and some apples soft?
Guide: All apples are hard at first. The reason that they turn soft is because they have been stored incorrectly in the wrong temperature and moisture.

Children: Why do apples have all different names and signs on the apples?
Guide: Because there are so many different varieties with different tastes and purposes, people would not be able to tell them apart when purchasing them. So names were given to them and stickers with their names are placed on them for easy identification at farms and grocery stores. Also names get combined when two apples get combined to make one new variety of apples. For example, when a Macintosh apple and a Jonathan apple are combined, the new name for this variety is Jonamac.

Children: How do you make apple cider?
Guide: You take the apples to a machine that smashes them to drain their juice.

Children: How do the apples come off the tree?
Guide: They have pickers (people who pick the apples) at the farm who go out when the apples are ready to be picked. They wear a basket around their waist, and as they pick the apples, they put them into their basket. They also have a long pole that they use to reach the high ones.

Children: How do they grow? How do flowers grow to make apples?
Guide: Bees pollinate them by moving from flower to flower.

Children: How do they get to the grocery store?
Guide: After they are picked and put into storage bins, most of the apples are sold right here at our store. But if stores want to buy them, big trucks come and take them to the store.

Children: Why do some apples grow big and some apples grow small?
Guide: When there are a lot of apples on a tree, they grow smaller because there is not enough room to grow. And the apples that are larger receive more moisture and sunlight and therefore they grow bigger.

Teachers created a display documenting a field trip to Whitehouse Fruit Farm.

Take-Home Survey

To encourage family involvement, the teacher sent home a survey to determine what kind of apple products the children had in their homes. The children and teacher made a graph to organize the information. The graph revealed that most children had fresh apples in their homes.
The children took home a survey to determine what kind of apple products they had in their homes.

Apples Up on Top

During the project, the children were read many fiction and nonfiction books about apples. After listening to a reading of the fiction book *Ten Apples Up on Top* by Theo LeSieg, the children made their own book. Furthermore, the children experimented to see how many real apples they could carry up on their heads.

The children made their own book after reading Ten Apples Up on Top.

Oxidation Experiment

The following experiment took place after the children had apple slices for a snack. The apple slices turned brown. The children decided to do an experiment to find out if they could stop an apple from turning brown. We found an oxidation experiment that involved using water, grape juice (we substituted berry juice), and lemon juice. The children predicted which liquid they thought would stop the apple from turning brown:

- Seth: Berry juice.
- Shelly: Water.
- Anna: Lemon juice.
- Mike: Water.
- Steve: None.
- Abby: Water.
- Selma: Lemon juice.
- Millie: Water.
- Carol: Water.
Sam: Water.
Ann: Water.

Next, the children dipped a different apple slice in each of the three liquids. The children did nothing to one apple slice. The children let the apple slices sit for 30 minutes and then compared the slices.

Results

- Nothing (air): turned brown
- Water: turned light brown
- Berry juice: turned the darkest brown
- Lemon juice: stayed white

The children conducted oxidation experiments.

Student Resources

Throughout the project, the children provided resources to aid in the investigation of the project. For example, information from the Internet was brought from home. They also brought in real apples, apple tree branches, and an apple robot.

Reflections on Phase 2

In Phase 2 of the project, it was evident that the Project Approach truly integrated the curriculum. It allowed the children to apply and practice skills in every subject area. Furthermore, it allowed the children to develop and apply higher-order thinking skills. The Project Approach also encouraged cooperative learning.
The field trip provided the answers to questions that the children had not been able to answer during their classroom investigations. However, in the future, we decided that we would send the questions in advance so the tour guide would be better prepared. We also would have had the children predict the answers to their questions before we went on the field trip. We also wish the children had made sketches at the apple farm. However, because the weather was cold, the children were not able to do so. We also should have had the children record and report back the answers to their questions instead of the teachers doing so.

It was a disappointment to the children and us that the apple seeds never sprouted.

**Phase 3**

Phase 3 of a project often includes a culminating event. The children prepare to share the story of the project by reviewing all of the project work, selecting material to share, and reflecting on the new knowledge. A letter is also sent home to parents explaining Phase 3 and inviting them to the culminating event.

The teachers sent home a letter explaining Phase 3 of the project.

We talked with the children about how they wanted to share everything they had learned with their families. They decided that they wanted to have a party. We asked them what kinds of things we should have at the party, and they said "food!"

In preparation for Phase 3, parent volunteers came in to make a variety of apple recipes with the children. The children decided what food they were interested in making, and the parents lead the cooking groups. The food was then served at the culminating activity later that afternoon.

Parents lead cooking groups, and the food was served at the culminating activity later that afternoon.

We had such a great response to the food served at the culminating event that parents asked us for the recipes. In response, we made copies of the recipes and created an apple recipe book.
The teachers created a cookbook of food served at the culminating event.

We also discussed what activities the children wanted to share with their parents. The following pictures show some of the documentation and activities that the children presented to their parents.

Documentation reflected the children's activities during the project.

Reflections on Phase 3

We were impressed with the number of people who came to the culminating event. The event gave the parents the opportunity to view and appreciate the hard work of the children. The children loved sharing the information that they learned by being the tour guides for the visitors. The event also showed the children that their work was important and valued. It really boosted their self-esteem. We felt a sense of relief and accomplishment after the day was over.

Conclusion

We teachers felt that the project was a success. The children took responsibility for their own learning and truly lead the investigations. We had no idea at the beginning of the project that the children would be juicing vegetables. The children obtained a wealth of knowledge and developed positive dispositions towards learning.

We teachers gained a better understanding of the Project Approach by completing this project. We feel that it is a worthwhile and effective teaching method. We will definitely continue to use the Project Approach in our classrooms and look forward to embarking on a new project. The possibilities are endless!
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