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ABSTRACT

This paper suggests an alternative approach to early childhood science education that considers contemporary trends in both literature and science. The whole language approach to picture books is recommended and this strategy is described in the four sections of this report. The sections provide information on the relationship between science education and children's literature, the planning of science activities through a children's book, the implementation of science activities for the sound concept through a children's picture book, and children's books that are appropriate for literature-based science activities. A sample unit based on a Korean children's book is presented. (DDR)

Literature based Science Activities in Kindergarten through Children's Picture Book

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Literature based Science Activities in Kindergarten through Children's Picture Book

The purpose of this presentation is to suggest an alternative approach to the early childhood science education in the light of more contemporary trends of both literature and science. This method of whole language approach to a well-selected children's picture books will be presented in 4 phases.

Phase 1. A brief description of the relationship between science education and children's literature.

Phase 2. The planning of the science activities through a children's book.

In this phase, a sample unit - "sound" will be presented with a Korean children's picture book. "Touch the sky, take a star", applied in a kindergarten classroom.

Phase 3. The Implementation of science activities for "sound concept" through a children's picture book.

This phase will be performed with a VCR tape that is taken from a Korean kindergarten class.

Phase 4. Suggesting a bibliography of children's picture books for literature based science activities.

I. The relationship between the science and children's literature.

At the present time, parallel events are occurring in the early

childhood education field of literature and science in Korea. Literature is not only an area of language development but the center of integration for the entire curriculum through whole language approach(Cho, et als., 1995; Cho & Suh, 1997; Hefner & Lewis, 1995; Lee, et als., 1998). Reading of literature is an interaction between the reader's experiential background and knowledge and the author's background and purpose. In early childhood science education, the process of acquiring knowledge is often more important than the actual end product(Lee & Lee, 1989; Chaillé & Britain, 1991). Both science and the literature are processes that must be constructed by the young children themselves. Children must experience the world where they live and be allowed to construct meanings and relationships for themselves.

The picture storybooks provide children with vicarious experiences through the book's characters, and help children develop language and concepts(Cullinan and Galda, 1994; Lee & Chang, 1991; Lee et als., 1997). During the story time, the character's experience in the story will help the listeners deal with the abstract new concepts presented in the book. In addition, follow-up activities are also enhanced by the child's initial and residual affective response to the book. Thus, the storyhour can be used as a springboard to the related science activities as well as a literary experience(Anderson, 1981).

Understanding why educators think it is desirable to link science and literature and how the book relates to those reasons, allows its contributions to be set in a larger context. While there are many specific reasons, they can be grouped into the following seven general categories for the sake of comprehension(Lee, et als., 1998).

1. **To help children learn scientific concepts and skills.** The professional literature on the connection of science and literature indicates that story books provide children with rich scientific experiences and investigations, which can capture the excitement

and appeal of children's favorite stories to promote understanding of science, to develop concepts, to solve problems, and to practice skills in a meaningful and interesting way.

2. To **provide children with a meaningful context for learning science.** Most educators' interest in scientific story books is focused on the capability of those books to provide children with a meaningful context for learning science and seeing it function in their everyday life. Children's literature places science in a familiar setting which children can identify with and which feel relevant and interesting to them. This setting can be related to their current everyday life.

3. To **facilitate children's development through use of scientific language and communication.** Many books describe how teachers use children's literature to help children develop their ability of scientific communication, use language to help themselves and others construct scientific meanings. They also develop common scientific understandings by modeling scientific situations using oral, written, concrete, and pictorial methods.

4. To **help children learn how to solve, reason, and think about scientific problems.** At the core of scientific activity is the ability to think, reason, and solve problems like a scientist Thus it is not surprising that one of the benefits of linking science with literature is that it will help children learn problem solving.

5. To **provide children with a richer view of the nature of science.** Connecting science with children's books has a potential to provide children with a richer, more realistic, and broader view of the nature and scope of science

6. To **provide children with improved attitudes toward science.** Advocates of linking science with children's literature

during instruction believe that doing so will improve children's attitudes toward science, will promote children's enjoyment of science, and will help children gain confidence in their scientific abilities.

7. To help children integrate science and literature study. Curricular integration is at the core of the movement to link science with literature. While focusing on its scientific and literary elements at the same time, children explore a story in a way that their increased understanding of its science helps them better understand the story and its literary components, and vice versa.

In designing the follow-up activities, the emphasis should be on the scientific process. The most appropriate scientific process for children of age from three to six years is observation, classification, measurement, and communication(Lee & Kim, 1991; Lind, 1991). Such process emphasizes the study of science as an active form of learning rather than a passive one.

The science education based on a picture storybook is a useful resource device for planning possible activities. It links the child's experience with a book to the child's knowledge, past experiences, and developing abilities.

The value of the literature-based science activities lies in its flexibility. Once this resource is designed for the children's favorite book, the teacher can selectively choose those activities which fit the best with a particular group's needs and interests as well as current learning objectives in other curriculum. With several pre-designed options, individual differences can be met in making assignments to individuals or small groups. It is not recommended for a teacher to cover up all the preplanned activities. Such a practice can destroy the chile's enjoyment of the book(Barrow & Salesi, 1982).

A selection of picture storybooks of integrating science should utilize the following characteristics:

1. Book relates to the process and / or content of science.
2. Story is memorable to children.
3. Story is focused on an action rather than a character analysis.
4. Book relates to children's experiences and interests.
5. Story's language is logical with a rich dialogue.
6. Book is reasonable length.
7. Well-designed book which unifies narrative and illustrations.
   A. Illustrations accurately reflect the action described in the text.
   B. Characterization pictorially well-designed.
   C. Mood of art matched to the story.

Ⅱ.The Implementation of science activities for "sound concept" through a children's picture book.

Selecting the storybook, the implementing 'sound' activities took 2 weeks : story book reading, sound exploration activities 1, sound exploration activities 2, follow up representation activities. The representation activities were writing or drawing.

A. Storybook Selection

Considering categories selecting quality book, the picture book was selected. The brief summary of the selected storybook is given below.

Title : Touch the sky, Take the star.
Author : Lee, J. Illustrator : Choi, K.
Publication: Borim, 1996.
Story Brief. : This is a story about Samulnori which is a play using Korean traditional instruments : Ching, Shoi, Changu and Buk(a kind of drum). This book is focused on the Korean

traditional rhyme.

B. Story book reading

After the teacher read the story book out loud, she asked her children what kind of instruments were introduced in the story, and later showed four instruments for them to recall.

*During the story reading process, child 1 was interested in the Shoi. The Shoi is a metal instrument that makes a big and loud metallic sound when hit by a rod. This child's interest of the Shoi continued from start to finish of the sound exploration activities. Child 1 and 4 kept up their interests even after many days, and expanded their interest to science activities. These facts signified that children's curiosity arising from story reading, was expanded to science activities. Next, child 3 was interested in the story book pictures with overlapping lines drawn to depict movement and vibration of instruments. The child, who pointed out the overlapping lines, expressed curiosity and said, "This picture looks strange", and "It's interesting".

A day after story reading, the teacher put the story book in the library corner where children could read it at anytime if they wanted to. Child 2 showed a good interest in the picture book, as he asked for the book even before the teacher put it in the library corner. Giving the children free access to the book, four children including child 2, got together spontaneously and read the story book repeatedly without the teacher's intervention.

C. Implementing of activities

1. Planning

In the process of reading the story book, children were especially interested in the sound of the instruments and the overlapping lines of the drawing . Based on children's curiosities, researchers selected two scientific concepts ; there

are many kinds of sounds , and sound has vibration. The concept that 'there are many kinds of sounds' was familiar to children. The researchers and the teacher planned and prepared for activities for the concept 'sound has vibration'. The researcher's planned activities were as follows. But the planning was just a plan. The actual activities could be expanded depending on the children's responses, and the researchers were ready to observe children's responses.

Planned activities are :

- Hitting various instruments
- Searching for sound making methods
- Feeling the vibration in the process of hitting by hand
- Feeling the vibration of Ching and Shoi.

2. Implementing

After 3 days of story book reading, the children started science activities .

The children began to investigate activities. Child 1 shouted, "Wow, it's like thunder".

Some children moved into their own activities developed by themselves. All of the five children explored the sound instruments by hitting strongly or softly. The child, who played the Sogo(small hand drum), found out that the sound differs depending on the hitting position, center or rim of the drum. The child was very interested in the differences and referred to differences when he played by hand or a rod, too.

All of the four children repeatedly made different sounds playing the instruments here and there. They were absorbed in making different sounds. They continued to show interests in representing the sound differences.

Child1 who was especially interested in the Shoi picture during reading time, expanded his reading experiences to science

activities. During the reading time, he said that he would play the Shoi in several different ways. He only wanted to play the Shoi, and not any other new instruments. He found out that the Shoi stopped sounding when he touched it right after he hit it several times. He said to his teacher, " Look, it's strange. It stopped sounding."

In this situation, the teacher responded to child 1 with the answer : "What did you find out? Is there anything special or interesting?", trying to stimulate the child's wonderful idea. Child 1 repeatedly put his hand on the vibrating Shoi and said , "I can feel it tickled. But when I pressed down the Shoi with my hand, the vibration stopped." The teacher gathered four other children to share the experiences of child 1.

The teacher let child 1 to introduce his finding to his friends. The four children's responses were as follows.

Child 3 : "It's really strange. I wonder why?"

Child 2 : "I think, Dongjo(child 1) touched the Shoi. That made the Shoi powerless and stopped the vibration. "

Child 4 : "Because Dongjo pressed down the Shoi with his hand, the sound stopped."

Child 3 : " When I touched it with my hand, I could feel it tickled."

Child 1 hit the Ching, touched it with his hand and sleeves and then identified the sound differences. He beat the Ching here and there. He also tried to differentiate from the back and front sound of the Ching. At that point, the teacher participated in the activities as a player. She asked, " Do you find any differences? Can I try to listen?", " I think the sounds are a little different . Don't you think so?" Child 1 replied , " The sound from the front is loud and the one from the back is tiny". The other children who just looked on, began to participate in the activities.

The children, who were playing the Buk(that is Korean drum), kept beating the drum without running into the other activities. They got a little bit bored. To let the children feel the vibration, the teacher put down her hand on the drum skin after beating the Buk.

Child 2 : " Miss Lee, I want to try. "
Teacher : " OK. Try ."
Child 2 : (putting down one hand on the Buk skin while beating the Buk with the other hand) "I can feel it tickled."
Child 1, 5 : "Wow, his hand is moving"
(when the teacher put down her hand on it)
Child 5 : " Miss Lee's hand is moving, too."
Child 1 : (putting down his hand on it) "I feel something strange"

*The researchers realized that it was effective for a teacher to participate as a player when children's activities did not develope due to their limited scientific knowledge.

*In the implementation process of these activities, the researchers recognized that it would be helpful to children if these activities could deal with the concepts of sound travelling with vibration. The teacher prepared three areas for the next activities .

Area 1 : Korean traditional instruments , cloths, towels , paper clips and so on were prepared

The researchers expected the activities as follows ;

- Feeling the vibration while beating instruments with hand
-Observing the movements of tiny materials while hitting the instruments
-Identifying the different movements depending on the

thickness of the sheets (thick cloth vs. thin paper) covering instruments.

Children approached area 1 and repeated sound-making activities such as beating instruments, feeling vibration and stopping vibration. After several minutes, child 3 asked the teacher, "Why did you prepare those things over there?" The teacher took the opportunity to expand activities and said, "Let's see, I think we can play with these things. Can you find a use for these paper clips?" Child 3 kept fingering the clips for a while and began to hit the Ching putting the clips on it. He indulged in moving the clips in response to the Ching beating strongly and softly. He said, "Wow, it's moving. It's bouncing and springing out." Then, Child 4 and 5 joined in the activities and tried other instruments.

* Children were strongly interested in the bouncing clips in response to the degree of loudness. The researchers could not convince themselves that the children understood that clip bounce was due to the sound vibration. Because the children said , "The clips bounce out far from here when I hit strongly. They don't move when I hit softly." The researchers thought that children might regard the clip moving as a result of beating power.

The researchers expected that children would find out that the clip movement is caused not by the beating power but by the vibration. One of the researchers decided to participate in the activities as a player. She began beating towel-covered Ching beside the children. Child 4 was interested in the researcher's behavior and said, " Look, the clips are not moving. Do it again, beat harder." Child 4, amused by that fact, tried to cover it with other materials, such as a plastic sheet or blanket. The teacher asked , "Why didn't the clips move when the Ching was covered with a towel or a blanket?" The child said, " Let me see, can I try harder?" and he beat the towel-covered Ching harder. But

there wasn't any other different response.

Child 4 wondered why sometimes the clips moved and sometimes they didn't. It seemed that he attributed the clip movement to the covering materials, not sound vibration. The researcher figured out that just asking the "why" question is not effective in catching up scientific concepts for children.

To help children understand the relationship between sound vibration and sound travelling, the teacher began to put her ear on the Ching when a child beat the covered instrument. The teacher and children listened to the sound with or without a towel, a blanket and a plastic sheet and talked about the sound differences.

Area 2 : 2 small tanks of water, glasses, hoses, tin cans, and chopsticks were prepared

The researchers expected the following activities :

-Playing with pipes or hoses where sound travels in the air

-Playing with pipes or hoses where sound travels in water

The researchers expected that the children could understand how sound can travel through air and water and reach their ears' through the sound traveling process activities. Child 1 began to blow out the hoses in the watertank. He was very interested in bubbling water and continued the activities. Child 2 who was in area 3, joined the bubbling activities and said, "It is my first time. It's really funny". Child 1 and 2 were fascinated by making bubbles not by the sound traveling contrary to the researchers' wishes.

The children were not interested in the sound traveling process. They wanted to make bubbles. Without researchers' participation, children didn't show any interest in the activities probing the sound traveling processes on their own.

The researcher put her ear on the table and said, " I want to listen to the sound like this". Some children showed some interest in the researcher's behavior. Child 2 put his ear on the table and let the researcher tap it. After repeating these activities several times, the researcher and child 2 covered it with a towel or a pillow, and listened to the tapping sound. She talked with the child about the differences in sounds .

This is an example of how something unintentional can be turned into a valuable science activity. The child showed an interest in the activities by listening to the tapping sounds from place to place and identifying the sound differences.

3. Follow up representing activities .

The children participated in representing activities. They represented the sounds they had heard in drawing and writing. The teacher showed the storybook and their own activity pictures to the children in order to recall their activities. In this process, children said that they wanted to play the Shoi again and they expanded to the activities next day.

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