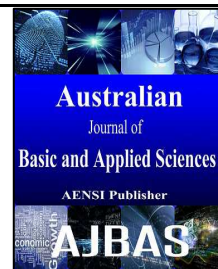




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### Integrating Knowledge of Science in the Teaching of Children's Nursery Rhymes

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#### ABSTRACT

**Background:** Science subject is difficult to understand especially for children at preschool level. Integrating the knowledge of science in the teaching of nursery rhymes facilitates the process of learning and children are able to connect nursery rhymes with science. This paper is based on an action research carried out on six year old children in a preschool. It employs qualitative research whereby the headmistress, the teacher and the researcher reflected on the various actions carried out in the classroom. **Objective:** The objective of the research is to integrate the knowledge of science in the teaching of children's nursery rhymes. **Results:** The findings indicated that the teacher showed enthusiasm and creativity in integrating knowledge of science in teaching nursery rhymes. Various activities carried out by the teacher in this study had influenced the practice of the teacher and students' learning. Besides learning the nursery rhymes students were able to broaden their scientific knowledge on spiders. **Conclusion:** This study affirms that knowledge of science can be integrated in the teaching of nursery rhymes. In addition, this study has strong pedagogical implication on teaching and learning of science through nursery rhymes.

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#### INTRODUCTION

Learning of literature and science involves critical and creative thinking. Chamberlin (1999) stresses that if a person is starting to look at the world a bit differently now, he has succeeded. He has taken his first step into the art of scientific thinking. Chamberlin also argues that scientific thinking requires a playful, insightful, and creative mind. Great scientists have an intuitive feel for the marvellous and mystical machinery of nature.

Many educationists are concerned about how to integrate the teaching of science and humanities subjects. Reinhardt (2006) argued that one of the factors resulting in elementary school teachers being reluctant to teach science could be the failure to conceive science as an interdisciplinary study. Instead, science is viewed as a discrete and isolated content area. Cobb (cited in Reinhardt, 2006) suggests that using works of nonfiction is a powerful way to begin and improve the teaching of science. Integrating science in the teaching of other subjects such as literature should be encouraged because such harmonious integration will help students to understand science concepts and make learning more interesting and meaningful.

Students enjoy listening to exciting stories such as fiction, adventures and stories of animals. They also have a lot of fun singing nursery rhymes during language lessons. The learning of science can be very meaningful and interesting if teachers make an attempt to integrate science in the learning of literature. This study focuses on the integration of science in the teaching of nursery rhymes.

**The objective of the research:**

The main purpose of the research is to integrate knowledge of science in teaching of nursery rhymes among preschool children (six years old). Following are the research objectives of the study:

1. To investigate whether the teacher is able to integrate the knowledge of science in the teaching of literature among preschool children.
2. To investigate how the lessons had influenced the practice of the teacher.
3. To investigate how the lessons had influenced the students' learning.
4. To ascertain the teacher's and the headmistress' reflection on the study.
5. To ascertain the researcher's reflection on the study.

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**Research questions:**

Based on the research objectives, five research questions were formulated:

1. Is the teacher able to integrate the knowledge of science in the teaching of literature among preschool children?
2. How had the lessons influenced the practice of the teacher?
3. How had the lessons influenced the students' learning?
4. What are teacher's and the headmistress's reflections on the study?
5. What are the researcher's reflections on the study?

**Literature Review:**

Studies on infusing science knowledge in teaching of literature are very limited. Colfax (2012) discovers that the use of poetry in the biology classroom enhances students' understanding of complex scientific theories. Watts (2001) also stresses that poetry has been used in the science classrooms for personal expression, memory aids and demonstration of content mastery.

Young, Connor- Greene, Woldvogal and Paul (2003) modelled a program known as *Poetry Across Curriculum* (PAC) in post-secondary institutions. Students and lecturers are asked to compose poetry that make connections with science subjects. The findings indicated that this approach enabled students to creatively express their content knowledge in science and enabled them to make connections between science and poetry.

Since this study employs action research, it is important to define it. Action research is making a significant impact in many professional contexts, particularly in teachers' classroom teaching. Carr and Kemmis (1986) defined action research as:

Action research is simply a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out (p. 162).

Lewin coined the term action research in 1944 and in 1946, he described action research as "a comparative research on the condition of effects of various forms of social action and research leading to social action". He also stresses that action research uses "a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action". McNiff (1988) and Lomax (1994) concluded that action research is educational research. McNiff (1988) stressed that:

Action research implies adopting a deliberate openness to new experiences and processes, and as such demands that the action of educational research is itself educational. By consciously engaging in their own educational development, teachers gain both professionally and personally, and it is this personal

commitment that counts in the process of human enquiry (p.9).

Bogdan and Biklen (1992) offered a broader view of action research as "the systematic collection of information that is designed to bring about social change." Elliot (1991) in his discussion on action research developed his own interpretation of action research as a form of teacher professional development and reflective practice.

Reason and Bradbury (2001) defines action research as an interactive inquiry process that balances problem solving actions implemented in a collaborative context with data-driven collaborative analysis or research to understand underlying causes enabling future predictions about personal and organizational change. Kemmis and McTaggart (1988) provided a spiral of steps in action research. The four steps in the cycle are:

**i) Planning:**

This stage involves a period of reconnaissance and problem analysis before drawing up a strategic plan of action.

**ii) Acting:**

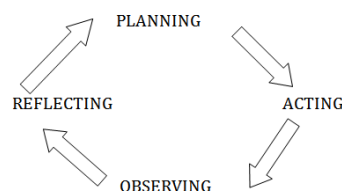
This stage involves the implementation of the strategic plan. Flexibility, negotiations and compromise may be necessary in implementing the plan.

**iii) Observing:**

Observation is about documenting the effects of critically informed action by using appropriate methods and techniques. Observation must be guided by the intent to provide a sound basis for critical self-reflection with practitioners. Observation data may come from a professional journal, case study notes, reports, test papers, check lists, meeting records, interviews, surveys, etc.

**iv) Reflecting:**

This stage involves the researcher reflecting on the results of the evaluation as well as on the way the whole action research process goes on. Reflection is usually aided by discussion amongst participants.



**Diagram 1:** Spiral Steps in Action Research (Kemmis and McTaggart, 1988).

**Methodology:**

This study employed an action research by Kemmis and McTaggart (1988). The samples in this study were a class of 34 children from an English

medium preschool in Penang, their English class teacher and the headmistress of the preschool. The children comprised of boys and girls aged six years. Most of the children were from English speaking background. Qualitative research was employed because in this research the headmistress, the teacher and the co-researchers reflected on the various actions carried out by the teacher in the classroom. From the information gathered through the recorded videotapes, the researcher was able to trace the professional competence of the teacher to integrate the knowledge of science in the teaching of literature. Besides that, the researcher also employed the observation method to obtain data related to teaching strategies used by the teacher in the classroom, students' participation, and their responses towards the lesson. The researcher also carried out interviews to obtain the teacher's and the headmistress's reflections on the research.

#### ***The teacher's background:***

The English teacher who taught the class had obtained her teaching certificate after attending a preschool course. She had been teaching English in the preschool from 1992 to the present (2015) and she has vast experience in teaching English. In this research, the English teacher, the head mistress of the preschool, and a few other teachers from the school participated actively and collaboratively with the researcher.

#### ***Procedures:***

In this research, during the first lesson the teacher taught the nursery rhyme 'Incy Wincy Spider' to the children and sang it with them. During the second lesson the teacher sang the nursery rhyme with the children and then she carried out several activities in order to integrate the knowledge of science about spiders to the children. In the third lesson the teacher carried out outdoor activities and engaged the children in writing, drawing and colouring tasks.

In this research, the researcher helped the class teacher as the coordinator in carrying out the research. The teacher was briefed on how to integrate the knowledge of science in the teaching of children's nursery rhymes. The teaching process (stage of acting) involved:

- Getting nursery rhymes into the classroom
- Sharing thoughts with the children
- Collecting and recording children's responses
- Encouraging writing, drawing and colouring
- Developing children's reading fluency to help them grow in language, reading and thinking and discovering knowledge of science through the nursery rhymes.

During the first step (planning) the researcher had discussions with the teachers and the headmistress of the preschool. The English teacher realized that she had never made any attempt to

integrate knowledge of science in the teaching of nursery rhymes. She decided to carry out an action research to bring changes in her teaching. She collaborated with other teachers in the school and planned the activities, to teach the nursery rhymes and to integrate knowledge of science in an interesting manner. During the second step (acting), the teacher carried out the lessons and the activities as planned. In the third step (observing), the teacher and the researcher documented the effects of actions and activities carried out by the teacher. During the fourth step (reflection), the teacher-researcher, the headmistress and the researchers reflected on the action research. The nursery rhymes used in this lesson is as follows:

#### ***Incy Wincy Spider:***

*Incy Wincy Spider climbed up the water spout.*

*Down came the rain and washed the spider out.*

*Out came the sunshine, dried up all the rain.*

*And Incy Wincy spider climbed up the spout again.*

The researcher gathered data for this study by videotaping the lessons carried out in the classroom. The researcher also observed the lessons carried out by the teacher in the classroom and outside the classroom. At the end of the study, the researcher carried out interviews with the teacher and the headmistress on their perceptions and reflections on the action research. The interviews were videotaped and transcribed. The data from the interview was analysed based on emerging themes.

#### ***Findings And Discussion:***

This section of the paper discusses the findings based on the research questions posed at the beginning of the study.

#### ***1. Is the teacher able to integrate knowledge of science in the teaching of literature among preschool children:***

In this action research, the teacher used a relatively innovative method to present the knowledge of science about spiders to children while teaching the nursery rhyme. Using this approach, she was able to make the children enjoy the nursery rhyme and at the same time convey the knowledge of science as well. In this lesson, after learning and singing the nursery rhyme, the children are able to discuss and discover that spiders are not insects, they belong to the family of arachnids, 'black widow' is the most poisonous spider, spiders reproduce by laying eggs, spiders trap insects and small animals in their webs for food, and so on. This study showed that the teacher used her creativity to integrate the knowledge of science in the teaching of nursery rhymes. She also brightened up the class by cheering children throughout the lesson.

## **2. How had the lessons influenced the practice of the teacher:**

Studies by Edward (2004) and Beylon (2006) focused on teachers' interactive behaviour when reading to the whole class have documented the impact of reading style on children's comprehension of nursery rhymes. In this study, a series of activities were carried out in the classroom to determine children's understanding of the nursery rhymes and their ability to sing as a whole class, small groups, and one to one settings. Thus, singing nursery rhymes in small groups offered much interaction and fun than one to one singing. Singing in small groups also gave greater enjoyment and confidence in children rather than singing as a whole class. Repeated singing of the nursery rhymes improved their reading skills, pronunciation and phonemic awareness.

Children's responses to questions related to the nursery rhymes and spider are critical aspects of the interactive process. In this study, when questions asked were answered, the children received immediate feedback which enhanced their literacy development too. During this activity, children had the opportunity to improve their knowledge by questioning the teacher. Comments made by young children during the question and answer sessions helped the teacher gain insight into the way children attempt to construct meaning and make sense of the nursery rhyme. Children's comments and questions increased their understanding of the nursery rhymes and their science knowledge as well.

This study indicated that there was a strong relationship between the use of nursery rhymes (literature) in the classroom and the development of science knowledge. In this research, the teacher had planned carefully the teaching process. Careful planning is one of the major features of *Direct Instruction*. Each curriculum provides: (1) a carefully crafted sequence of tasks and learning; (2) logical formats embedded in teacher-student communication that facilitate students' inductive constructions of concepts and relationships; and (3) a careful arrangement of practice and ongoing assessments of learning. However, this planning is invisible to the children. What children actually experience is interaction with the teacher and peers, and mastering of each task. The following are some aspects of planning and organization done for this lesson:

1. Brief explanation is given by the teacher to ensure that each child begins with lessons for which he or she is prepared. This means that children are immediately able to learn very quickly what the teacher is teaching, and therefore children learn more in short duration of time.
2. Instructions are organized in a logical-developmental sequence. All of the concepts, rules, and strategies that students need in any lesson have already been taught. In addition, what children

learned in earlier lessons were used in subsequent lessons. As such, children were actively involved in building knowledge.

3. For example, in the first lesson the children used about five minutes for pronouncing new sounds; another five minutes on reading new vocabulary; "the slow way" sounding out; another five minutes on reading old vocabulary "the fast way" blending; and five minutes of review. Later lessons worked on many of the same strands, adding more science concepts about the spider and addressing harder problems such as spider's family group, the way they breed etc. This organization of instructions held children's attention and helped children to retain knowledge from one day to another..

4. Gradually, instructions moved in an organized manner from a more teacher-guided to a more independent learning by the students. This is called mediated scaffolding.

5. Short oral proficiency questions were given after learning the nursery rhymes to ensure that students have mastered the nursery rhymes and to determine which skills needed improvement. Frequent evaluation sustained the quality of instruction and students' understanding.

## **3. How had the lessons influenced the students' learning:**

Science to children in this twenty first century has to be presented in such a way that they will love it. In this study, the children were engaged in singing the nursery rhyme and dancing. The children also enjoyed moving their bodies like spiders. The teacher successfully related the nursery rhymes to their daily life and made the lesson interesting.

The children also learned to write the nursery rhymes and drew the pictures of spiders and coloured them. The teacher provided pictures of spiders and spider webs to those who were unable to draw and asked them to colour those pictures. Besides that, the teacher also actively engaged the students in discussion, relating their experience about spiders and broadening their scientific knowledge of spiders.

The children were also involved in the outdoor activities such as observing the spiders in the backyard of the school and learned how the spiders made their webs. This made learning more meaningful and interesting.

### **Teacher's and headmistress's reflection:**

The teacher reflected by saying that she was happy with the outcome of the lesson. She said that a lot of preparation was done to instill the knowledge of science in learning the nursery rhyme. The children showed great interest and were inquisitive to learn more about spiders. Toy spiders were able to arouse their curiosity. The children were able to pronounce better and answered all the questions pertaining to the spider.

The children participated actively and were not bored during the lesson. Teaching children nursery rhymes is a great way to stir their imagination and creativity and enriching their vocabulary. Preschoolers are very curious, and by engaging them in a creative nursery rhyme such as "Incy Wincy Spider," the teacher can get their minds working. The children will soon be interested to learn more nursery rhymes. Teaching children about nursery rhymes is a wonderful pre-reading activity. Young children of this era often know many of the rhymes by heart, and are comforted by the familiarity, but aren't aware of some additional levels of information in the rhymes. It is good to focus particularly on building vocabulary, rhymes and phonemic awareness, and use them as an avenue to begin the learning process for these basic skills

The teacher reflected that another way to enhance learning is through question and answer method. Naturally, if the child asked questions about why, what, who, how or when (children of this age are often not aware of "when"), the teacher can use these questions as a leap-off point to enhance discussions. If the child doesn't ask questions, the teacher can then encourage exploration by asking questions.

She also reflected while teaching early learners, the prime aim is to arouse the interest of the children, and the way to do this is by making learning as interesting as possible. The teacher's job is to create or use activities that are stimulating enough to engage children into the learning process. Teaching a subject like science can be regarded as experiential learning. This is done through the five senses, "...that is why I brought many toy spiders because I wanted the children to touch them, feel them and count their legs". In other words, this study had changed the teacher's practices in the classroom as suggested by Carr and Kemmis (1986). She was also fully committed in planning and carrying out the lesson which contributed to her professional development as stressed by McNiff (1988).

Similarly, the headmistress of the preschool reflected that integrating knowledge of science in teaching of nursery rhymes is a good attempt made by the teacher. The headmistress always encouraged her teachers to integrate various knowledge such as mathematics, music, body movements and so on in teaching of language and children's literature. She stressed that preschool children should be exposed to knowledge of science in an interesting manner. Being young and having the natural ability to adapt to situations, early learners are more interested in the learning of science. This is because of the fact that they are keen on situational based learning. Also, since teaching science to early learners is mostly activity based, children are more keen to learn. In the course of experimenting with what they are presented with, they tend to learn a lot more and pick up most of the objectives out of their own interest. Interest

driven lesson plans are reasonably considered to be the best method of teaching early learners.

#### ***The researcher's reflection:***

The teacher used toy spiders of various sizes to arouse the children's interest in her lesson. The children were really excited and enthusiastic about spiders when they had the hands on experience to touch and feel the hairy toy spiders.

The lesson became more lively when the teacher started to explain the nursery rhyme in the form of a story and sang the nursery rhyme together with the children following the spider's movements. Later she engaged the children in an interesting discussion about the habitat of spiders such as:

- i. Where do spiders live?
- ii. What do they eat?
- iii. How do they reproduce?
- iv. How do they move?
- v. Are spiders poisonous?
- vi. How many legs do they have?
- vii. Are spiders insects?
- viii. Which family do they belong to?
- ix. How do spiders make their webs? etc.

The teacher also showed pictures of different types of spiders to children and encouraged them to share their experiences about spiders. The teacher also showed real spiders to the children and took them to the backyard of the school to see the spiders on plants and how they make their webs. The teacher also encouraged the children to ask questions. From the researchers' reflection, the teacher was well prepared and very confident in carrying out the lesson. She really enjoyed teaching the children and throughout the lesson, the children were engaged actively in the process of learning. The teacher was also very creative because the children were involved in various activities such as singing, dancing, thinking, sharing ideas, making observations, touching and feeling, reading, writing, drawing, colouring, getting involved in outdoor activities, and building knowledge.

Read aloud sessions are vital to promote children's desire to read independently and foster improvement of independent reading skills. As such, the lesson would have been more interesting if the teacher had used bigger charts with large prints and bigger pictures when children were reading and singing the nursery rhyme. The teacher also could have used some background music such as guitar or piano music to enrich the singing session and to make the lesson livelier.

#### ***Suggestions:***

Preschoolers by nature love to explore. They are curious, like to ask questions and love exploring their world. You might ask "what kind of science activities can preschoolers do?" What can't they do?

Science for preschoolers can include things that they see in their everyday environment at home, in

their neighbourhood and the outdoors. Preschoolers benefit from exposure to science. Encourage children to ask questions and try to make science fun to learn. Children should be exposed to early science by collecting rocks, cooking in the kitchen, reading about the weather, dinosaurs, and space, etc.

There are many everyday experiences through which the teacher can focus on science concepts. Mixing ice cubes with water, playing with magnets and learning how to mix colours give children the opportunity to discuss the knowledge of science. The kitchen can be a home science lab for measuring and cooking concoctions. Playing with water and bath toys can show what sinks and what floats in water and why.

***Here are some tips to integrate and consider in having fun with science:***

- i) Provide hands on experiences for learning science concepts.
- ii) Listen to pre-schooler when they make their own observations while learning.
- iii) Focus on everyday experiences that children can relate to.
- iv) Use fun objects to include in learning about mixing colours, playing with sand, playing with sound, magnetism, etc.
- v) Ask children questions to encourage discussions.
- vi) Encourage children to ask questions and have open discussions.

***Conclusion:***

This study shows that integrating knowledge of science in the teaching of nursery rhymes can be carried out successfully if the teacher plans her lesson well. Simple nursery rhyme such as 'Incy Wincy Spider' are more meaningful to children when the teacher relates the nursery rhymes to the children's daily life and integrate the knowledge of science with it (Frazier and Murray, 2009). By doing this, learning becomes more fun and meaningful. This innovative approach adopted by the teacher in the teaching of nursery rhymes, sets the true spirit of integration in science as stressed by Watts (2001). As far as nursery rhymes are concerned, nothing has stood the tests of taste and time with young children as well as 'Incy Wincy Spider'. The melody of every nursery rhyme often stays in the memories of children. Voaden (1932) stressed that while reading poems:... children come to see that poems are essentially combinations of feeling and music. They take the same delight in them that they take in singing. Even when reading silently they feel the poem as music. They listen to the rhythms and intonations; they train their auditory imagination. (p:2)

From my observation the teacher showed positive attitude and pedagogical knowledge in integrating knowledge of science through nursery rhymes. The teacher was also successful in making

connections between the two disciplines as suggested by Young *et al.* (2003). The findings of this study have vital input for the Education Ministry especially for the Curriculum Development Centre in designing a *Curriculum Across Disciplines* for preschools. Hope this study will shed some light on teachers and Teacher Education Division on how to integrate knowledge of science in the teaching of nursery rhymes.

The main limitation of this study is that knowledge of science was integrated using only one nursery rhyme over a period of two weeks. Perhaps future research should integrate knowledge of science using more nursery rhymes for a longer period. Future research can also integrate knowledge of mathematics and numeracy in the teaching of nursery rhymes. Current study only used a class of preschool children as sample. More similar studies should be conducted on larger samples of preschool children or primary school children to determine the effects of the study. The current study only analyzes qualitative data. Thus, it is hoped that future studies will triangulate quantitative data with qualitative data.

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