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Faculty of Teacher Training and Education (FKIP)
English Education Study Program, Bandar Lampung University (UBL), Indonesia

PROCEEDINGS

THE FIRST INTERNATIONAL CONFERENCE ON EDUCATION AND LANGUAGE

ICEL 2013

28 -30 January 2013

Organized by:
Faculty of Teacher Training and Education (FKIP), English Education Study Program
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PREFACE

The activities of the International Conference is in line and very appropriate with the vision and mission of Bandar Lampung University (UBL) to promote training and education as well as research in these areas.

On behalf of the First International Conference of Education and Language (ICEL 2013) organizing committee, we are very pleased with the very good responses especially from the keynote speakers and from the participants. It is noteworthy to point out that about 80 technical papers were received for this conference

The participants of the conference come from many well known universities, among others:
University of Wollongong, NSW Australia, International Islamic University Malaysia, Kyoto University (Temple University (Osaka), Japan - Jawaharlal Nehru University, New Delhi, India - West Visayas State University College of Agriculture and Forestry, Lambunao, Iloilo, Philipine - Bahcesehir University, Istanbul, Turkey - The Higher Institute of Modern Languages, Tunisia - University of Baku, Azerbaijan - Sarhad University, KPK, Pakistan - Medical Sciences English Language Teacher Foundation Program, Ministry of Health, Oman - Faculty School of Arts and Sciences, Banga, Aklan Philippines - Sultan Ageng Tirtayasa, Banten, - Pelita Harapan University, Jakarta - STIBA Saraswati Denpasar, Bali - University of Muhammadiyah Yogyakarta - Ahmad Dahlan University Yogyakarta - Sriwijaya University, Palembang - Islamic University of Malang - IAIN Raden Fatah Palembang - Universitas Diponegoro, Semarang, Indonesia - Universitas Haluoleo Kendari - State Islamic University of Sunan Gunung Djati, Bandung - Tadulako University, Central Sulawesi - Sanata Dharma University - Lampung University and Open University,

I would like to express my deepest gratitude to the International Advisory Board members, sponsors and also to all keynote speakers and all participants. I am also grateful to all organizing committee and all of the reviewers who contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector of Bandar Lampung University (UBL) who gives us endless support to these activities, so that the conference can be administrated on time.

Bandar Lampung, 30 January 2013

Mustofa Usman, Ph.D
lCEL 2013 Chairman

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The First International Conference on Education and Language
(ICEL 2013)
BANDAR LAMPUNG UNIVERSITY
Bandar Lampung, Indonesia
January 28, 29, 30, 2013

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Table Of Content

Preface ii
Steering Committee iii
International Advisory Board iii
Organizing Committee iv
Table of Content v

Keynote Speaker :

1. The Adoption of E-Learning in Teaching and Learning Processes; an Option for Life-Long Education – Baginda Simaibang 1-9
2. Engaging with Content and Language Using Student-created Blended Media – Garry Hoban 10-14
3. Duckling? No, Swan! Non-native Teachers Teaching Spoken English to Non-native Learners - Jayashree Mohanraj 15-22
4. The Development Of Guidelines For The Arrangement Of Character-Based English Language Lesson Plan For The Teachers Of Junior Secondary Schools In Surakarta City: A Preliminary Study - Joko Nurkamto 23-28
5. Assessment For Learning: Charting A Future In The Malaysian Higher Education - Mohamad Sahari Nordin 29-37
6. Knowledge Construction And Sharing In A Networked Collaborative Environment - Nuraihan Mat Daud 38-43
7. Teaching English In Today's World - S Mohanraj 44-47
8. Curriculum Improvement For Better Indonesian Education: A Reconstructed Philosophy Of Education Revisited - Udin Saripudin Winataputra 48-56
9. The Implementation Of The ICT-Based Thesis Supervision At One Of Postgraduate Programs In Indonesia - Ujang Suparman 57-62
10. The Development Strategy Of Sustainable Competitive Advantage At Indonesian PHEIs - M Yusuf S Barusman 63-71

Paper Presenter :

11. Employing Experiential Learning To Teach Writing For English As A Foreign Language Learners Through A Reflection Project - Adesti Komalasari 72-78
12. Facebook Base Writing Learning For Teaching English As A Foreign Language – A. Alfian Cahyo Budiardi 79-83
13. The Effect Of Curriculum In Building Creative Nation - Azizah Husin 84-89
14. Communicative Approach In Teaching English As A Foreign Language – Bertaria Sohnata Hutauruk 90-96
15. Mispronounced Consonants Of Basic Listening And Speaking Students Of Universitas Klabat - Billy Melvin Sakul 97-104
16. Teaching English Conversation Through Portfolios – Budiawan 105-108
17. The Power Of Concept Mapping To Improve Reading Comprehension - Candra Jaya 109-115
18. Theory Of Mind - Della Raymena Jovanka 116-121

19. Science Learning Model for Kindergarten - Denny Setiawan 122-129
20. The Effectiveness Of Using Dialogue And Prose Passage Techniques Improving Speaking Ability Of The Students At Muhammadiyyah University Tangerang - Destiani Rahmawati 130-142
21. Characters Of William Shakespeare In Translation On Shakespeare In Love Subtitling: A Systemic Functional Linguistic Approach - Diah Supatmiwati..... 143-156
22. An Analysis Of Language Learning Strategies Use - Dina Rachmawati. 157-165
23. Development Of Web-Based Instructional Model – Fadli 166-173
24. Project-Based Instruction Guided Lesson Study Improve the Achievement of Learning Outcomes on Educational Research Methodology Course at Department of Biology - Hadi Suwono 174-181
25. Elimination Of Misconceptions On English And Motivation - Himpun Panggabean 182-186
26. Improving Class X. 2 Students' Speaking Achievement Under Round Robin Technique - Istiqomah Nur Rahmawati ..... 187 – 194
27. Greek And Latin Affixes And The Generation Effect - Joseph Scott Oliphant 195-201
28. The familiarizing of Roby's Model in Teaching Listening Skill For 8th Grade Students of Junior High School - Jumbuh Prabowo 202-205
29. Infix {-Um-} As Verbal Former In Muna Language: Morphology, Semantic, And Syntax Analysis - La Ode 206-213
30. The Patterns Of Sasak Code Choicee - Lalu Abd. Khalik 214-223
31. EFL Writing Strategies of the Second Year Students of SMPIT Daarul 'Ilmi Kemiling Bandar Lampung - Muhammad Rudy 224-229

SCIENCE LEARNING MODEL FOR KINDERGARTEN,

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Abstract

Science education is essential to the development of kindergarten students. Integrating science education into education from an early age, intended to help children understand the world around them and improve critical thinking skills. Science can not be taught to children in a way like other knowledge that is to tell the children directly yield discoveries in science. This is because on the one hand, science is observation and exploration of the world around us, including questioning, investigating, analyzing, and drawing conclusions. On the other hand, children are often eager to know and they are intuitive. They try to understand the reasons why things happen and busy looking for answers. In other words, they seem to have a natural aptitude for science. Thus, children should be actively involved in the learning process of science.

This research is the development of a model that aims to make science learning strategy for kindergarten children to develop their potential as a researcher in the future. The research began with capturing the habits, needs, and hopes of kindergarten teachers in the teaching of science through a questionnaire. The results together with the results of literature study on the teaching of science, used to make a prototype of science learning model in kindergarten. Then the prototype was tested in a limited area in some kindergartens to get input as a revision material. This guide was then revised and will be widely disseminated to other kindergartens as an innovation in science learning in kindergarten.

Keywords: Science education, science learning strategy, science learning model

1. INTRODUCTION

Science education is really important for the development of students. Putting the science education into early education, aims to help kids to understand the world around them and also to improve their critical thinking skills. Science education needs experienced by the children since their early age, such Oaks' opinion (1990) below:

"… all students, especially those in underrepresented groups, need to learn scientific skills such as observation and analysis at a very young age".

Actually, children are already familiar with the way of think of science experts, long time before they formally learn it in the class. Zeece (1999) said, the attitudes and behavior of young children that indicate that they are involved on the behavior and the way of think of scientists, are appears long way before they study at class.

But Zee (1999) is also regretted when science education is formally introduced at schools; the understanding of science is often just a fact in learning. This approach has led some educators think that most science lessons which formally given are not the real science.

Teach science to the children cannot be taught in a way like teach the other knowledge, such telling them directly about the result of various inventions in science field. This is because in one side science is about observations and explores the world around us, includes questioning, investigating, analyzing and taking conclusion. In the other side, children are often curious and intuitive. They try to understand the reason why something could happen and busy trying to find the answer. In the other words, they seem to have a natural aptitude for science. Thus children are should actively involved in science learning process. This statement is along with the opinion of Kilmer and Hofman (1995) that said:

"While it is appropriate to introduce older students to science history and expect them to learn facts discovered by others, young children should learn science (and all other areas of study) through active involvement – that is, through first-hand, investigative experiences. Young children should be involved in "sciencing" versus the learning of scientific facts presented by others".

The opinion of Kilmer and Hofman shows that children in young age should learn science through active involvement, such as direct experience and investigating experience.

Children are natural scientists, not just because they are always curious and energetic, but they have the instincts to control the experiments. The purpose of science education at the initial level should encourage and increase their desire to explore the world around them and help foster an enthusiastic attitude towards the real science. Kindergarten kids really want to learn and open the opportunity to explore science. At this age, they begin to understand the relationships between objects, living things and inanimate objects, environment, animals, seasons, and how science affects everyday life. Science activities for them have to be creative, simple, and to be involved, and the children should be challenged to observe, ask questions, predict and explore.

However, there is only a little time in kindergarten that used to teach science. Science activities only appeared sporadically. This is unfortunate considering since their early age, children are already build concepts including mathematics and science that make children able to apply the concept that he mastered, develop the existing concept and develop the new concepts. In this case Charlesworth and Lind (1995) suggested:

"Young children begin to construct many concepts during the pre-primary period, including mathematics and science concepts. They also develop the processes that enable them to apply their newly acquired concepts, expand existing concepts, and develop new ones".

In Kindergarten, science education is belonging to the realm of children's cognitive development, together with knowledge of basic mathematics. Generally, the kindergarten teachers are only understand on how to develop children's cognitive generally and they do not emphasize the importance of science education. This is maybe because the little portion of science education in the curriculum and the teachers' lack of knowledge about how to teach science in kindergarten. To help the teachers teach the real science, science education that is capable to improve the ability of children to act and behave like scientist, it is necessary to develop a model of science learning that is simple, easy to understand and implement, but it is adequate to educate the children to become scientists in the size of the developmental age.

1.1 How Children Learn Science

Teaching science to the kindergarten children requires an understanding of how children learn and then providing them appropriate learning experiences. The children's understanding of science is grown from the fundamental concept that they developed during their early age. Most of our understanding on how and when these developments happen, derived from the research which theory-based from the concept of development proposed by Jean Piaget and Lev Vygotsky. These theories raise a constructivist approach, which placed the children as intellectual investigators that make their own discoveries and construct knowledge. In this case Osborne and Freyberg (1985) said:

"Constructivism has important implications for science education, especially in today's classrooms, where students are encouraged to engage in the inquiry process rather than memorize isolated science facts".

If children learn science and begin to understand science, the educators should choose science materials and experience that suitable with the children's cognitive capacity for different levels of development. Charlesworth and Lind (1995) distinguish the specific learning experience that should be experienced by the children as child that is individual naturalists, informal and structured. These learning experiences are different in terms of who control the activities: adults or children.

In the naturalistic experience, children control and choose the activity. Naturalistic experience spontaneously initiated by the children while they doing everyday activities. This experience is the main models of children's learning during the sensor motor period. Naturalistic experience can also become a learning model that is useful for older children. With naturalistic experience, the role of adults is to provide interesting and rich environment for the children. The adults should offer some things for children to see, touch, feel, smell and hear. Adults should observe the children's activities, note the progress, then give response generally, give nod and smile, or encourage the children with words. Children should know when they do the right thing.

In the informal experience, children choose the activity but the adults intervene in some things. Adults initiate informal learning experience when children involved in the naturalistic experience. Informal learning experience happens when adults or educational institutions or both are indicating that this is the time to do the activity. For example, children may be on the right track in solving the problem but they need guidance or encouragement.

In the structural experience, adults are choosing the activity for the children and tell them the children about what they need to do. Structural experience is lesson and planned activities that can be realized in a few different things. For example, Susi is a four year old girl. The teacher decides that she needs counting exercise. The teacher said, "Susi, I have several block for you to count. How many blocks that I have?"

1.2 What Teacher Should Do in Teaching Science

1.2.1 Determining the Purpose of Science Education

According to Conezio and French (2002), desired goals of science education in the early age curriculum covering what we expect from children to achieve three different aspects, such as content or materials, process, attitudes or characters. Content or materials are related with the knowledge that represents what we know about the world. The knowledge of children is growing all the time, and their desire to communicate and demonstrate their knowledge needs to be recognized and supported. The process to describe active components from science is covering activities like predict, observe, classify, make hypothesis, do the experiments and communicate. Adults should support the children in practice and apply these skills in various activities throughout the day. This can be done by showing genuine concern for observations and predictions made by the children and with providing various kinds of materials and environment that invite experimentation.

Certain attitude or characters are also important for search and discovery. This is covering curiosity, encouragement to do the experiments and desire to prove the theory and share the ideas. One of the main purposes of science curriculum in early age is the development of scientific thinking for the children. Think science is different with thinking about the scientific facts. Scientific think involve the children in the discovery process. Instead of learning about something that already discovered by other people, scientific think will lead the children to make their own discovery. Scientific think is manifested by the children through asking questions, conducting investigations, collect the data and finding the new answer. To encourage to children to think scientifically, the teachers should see the children as active learners and give them various activities to explore. Those activities will allow the children to build and develop their understanding that not only valid but also valuable for their intellectual development in the future.

1.2.2 Shape the Environment

An environment that encourages children to think scientifically is the one that give the children time, space and materials to train their curiosity. And also the one that give them the freedom to be involved into exploration which centered towards children and experiments. To be involved in scientific think, the children need an access to materials that can be use and tools that can help them. They need place where they can dig and play with the water. They also need glass, measurement tools, bucket and access to natural world.

(Ruth Wilson,….)

1.2.3 Using Finding Learning Strategies

The teachers are not allowed to give mature ideas or concepts to the children, children needs to find and build their own ideas and concepts. Developing the concepts or new ideas is an active process and usually begins with the child-centered discovery that focusing on asking questions which is relevant towards the children. Discovery is involving skills and activities that related with science, the focus is on active research on the knowledge or understanding to satisfy the curiosity of children. As noted by Lind (1999, p.79)

" While inquiry involves a number of science-related activities and skills, the focus is on the active search for knowledge or understanding to satisfy students' curiosity"

1.2.4 Using Productive questions

Teachers can improve or expand or giving the learning foundation by asking some productive questions at the right time. Questions about measurement may be the perfect question to start asking. For example, how long the ice in the glass will melt? How much time that the ice needed to melt when you put it on the table? Questions about treatments and why, may soon follow. For example, "what will happen if we break the ice into smaller pieces? Why do you think that ice on the table will melt faster than if you put it on…? Can you give rules why ice in the water melt first?

Productive Questions to Encourage Scientific Questions	Usability/ examples	Examples
Examples of attention or focusing	Asking attention for significant details	What are you doing? How it feels?
Measure and Counts	Provide more accurate information	How much? How heavy?
Comparison	Encourage analysis and classification	How it looks? How is the difference?
Action	Encourage exploration of things and events; and also to encourage prediction	What is this..?
Filling issues	Support the planning and try a	How can we…?

	solution of a problem	
Thought.	Encourage the reflection of experience and new ideas construction	Why do you think? Can you explain that?

*Adopted from Martens, 1999, p.26

1.2.5 Encourage Social Interaction

The construction of knowledge by children can be enhanced through social interaction with sharing observation and ideas between them. The children should be encourage to work together in building the theory, test the theory, and then evaluate which one is valid and which one is not, and why (Conezio and French. 2002, p.13).

Joint exploratory where the children can works together can be very useful to encourage the curiosity and stimulate new ideas (Chaille and Britain,2003). One of many ways to involve the children into joint investigation is through problem solving that focusing on certain situation.

1.2.6 Make Science Projects

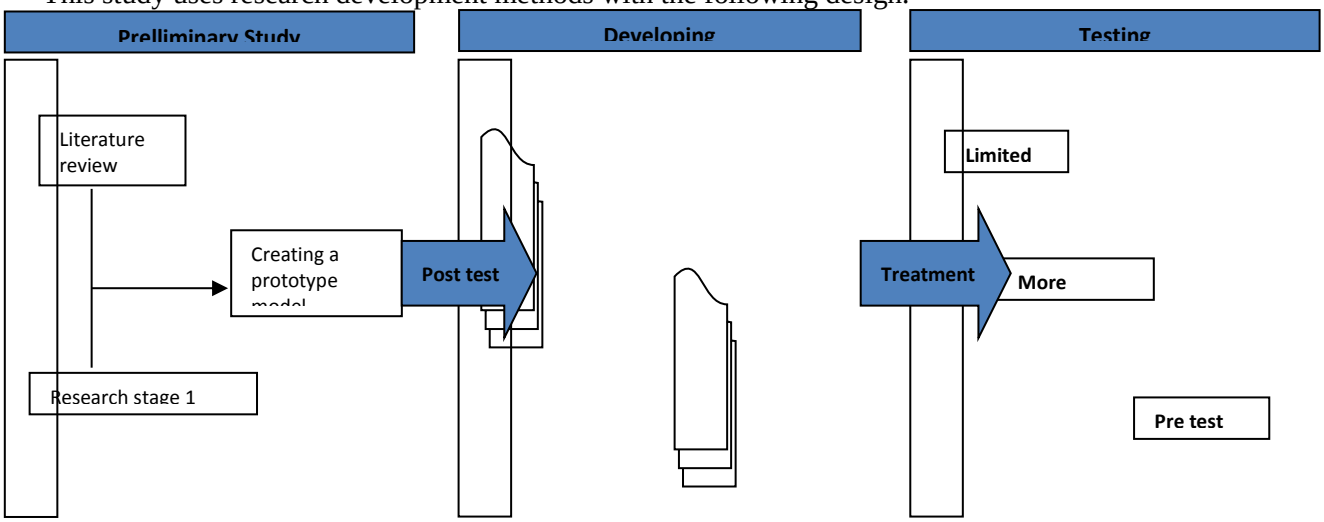
Science projects in kindergarten will give an opportunity towards the children to explore knowledge with doing observation and prediction that based on observation. The concept should easy to understand and the materials that will be used in the science projects must be non-toxics and easy to manage by small hands. The activity and projects like this will help the children to grow and learn in a new way, and also help them to more understand about the concepts and scientific principles. The researchers found that students who participated on science projects show significant result more than students who learn in traditional way.

Kindergarten kids already developed their skills that related with asking questions, doing observations and experiments, take conclusion and share their inventions. That is why science for early age children should involve activity for asking, finding answers, do investigations, and collect data, and the children are not only become the reminders of facts, not thinking and not trying to understand the world. This approach allows the children for being involved in the natural investigation (Kilmer and Hofman, 1995; Lind, 1999) and having fun experiences (Duckworth, 1987).

2. METHODOLOGY

2.1 Research Methods

This study uses research development methods with the following design.



Research and Development is a determined process or steps used for developing a product or improving products. The whole practices of this study are using the following method.

1. Descriptive (initial research to collect data on existing conditions)
2. Evaluative (evaluation of the testing process of product development)
3. Experiments (test the efficacy of the product)

The steps taken are as follows.

1. Gathering information
   a. Measurement needs, the activities identified the need for an effective model of science learning in kindergarten.

b. Literature study, that is, collecting and reviewing literatures related to science learning, what components are involved, as well as procedures and what tools and materials needed for learning science in kindergarten; as well as what kind assessment tools used to measure children's ability to learn science .
c. Development of a prototype model of learning science in kindergarten

2. The development model of learning science in kindergarten
3. Limited testing on implementation of prototype of a model of learning science in kindergarten at an identified kindergarten
   a. Analyzing the testing result on the application of the prototype model of learning science in kindergarten
   b. Revising science instructional model according to the results of analysis towards the results of the implementation of a prototype test model of learning science
4. Trial implementation of the revised model of science learning
5. Examination
   a. Field trials
   b. Observations, interviews, questionnaires.

2.2 Population and Sample

1. Population is a teacher and kindergarten children in Pamulang.
2. Sample
   a. For the preliminary stage, the sample was taken in as much 30% of kindergarten teachers in the district and 30% of Pamulang kindergarten headmaster in the district. Samples were randomly selected.
   b. For a limited test, the sample was teachers and children (in one class) at a kindergarten which are selected based on the results of the identification. The criteria are kindergarten that has appropriate equipments in accordance with the developed model, has teachers who able and willing to be sampled in the trial and received permission from parents.
   c. For a more extensive test, the sample is teachers and children (at 3rd grade) at three kindergartens whose were selected based on identification. The criteria are kindergarten that has appropriate equipments in accordance with the developed model, has teachers who able and willing to be sampled in the trial and received permission from parents.

2.3 Respondent

a. In the preliminary phase of the study, respondents were kindergarten teachers randomly selected from about 30% of the total number of kindergarten teachers in Pamulang. Beside that, respondents were also selected from 30% of the total number of kindergarten headmasters in Pamulang.
b. In a limited test phase, respondents were teachers and children in one group (A or B) available on one kindergarten in Pamulang
c. In the testing phase with a wider scale, the respondents were teachers and kindergarten children in group A or B as much as 3 of 3 kindergarten classes in Pamulang

2.4 Place and Time Research

1. Place of Research
   The research was conducted in the South of Tangerang, Pamulang. It is because Pamulang became an area that has many characteristics, each of which is varies in term of characteristic and it is possible to choose the kindergarten and harmonize it with criteria expected from this study. Hopefully this research can find the most effective model to be implemented in kindergarten.

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2. Time Research
   Research will be conducted from March 2012 to December 2012.

2.5 Data Collection and Analysis Techniques

Techniques on collecting data used in this study were adapted to following research questions.

Research Questions:

1. How children develop concepts related to science?
2. Which science learning materials that is popular amongst children?
3. What kind of learning experience that should be experienced by children in learning science?
4. What should be provided and what teachers should do in advancing science education in kindergarten?

To answer these research questions, survey became the main technique to collect data. The technique using a questionnaire with closed and open questions that were distributed to the respondents according to the samples selected randomly. Beside survey, interview is also used in order to deepen the data that has been collected. To

strengthen data, additional documentation also conducted in the studies in or der to find sources of literature that is relevant to the research question. Data were collected through questionnaires were analyzed quantitatively, and then described in narrative. It collaborates with the data collected through interviews and data collected through the literature study.

As for the questions: Which science learning materials that is popular amongst children. The question was answered using observation techniques which involve the use of instrument observation sheet as well. It is done with the intention to see the implementation of science learning during the test. These data were then analyzed qualitatively and then described in narrative.

3. RESULTS AND DISCUSSION

From the results of a survey on science learning in kindergarten, we have obtained the following data:

1. Learning system, most of the samples using the system of group (51%). The rest use the classical system (25%), area (13%) and central (11%).
2. Science activities per week, mostly a 1-time (55%). The rest is a 2 times (24%), 3 times (12%) and more than 3 times (9%)
3. Resource for planning science activities, most of the resources were taken from Weekly Activity Plan (36%). The rest from Daily Activity Plan (31%), curriculum (23%), and other sources (10%)
4. Sources for retrieving learning indicators, some resources were taken from curriculum (69%). The rest taken from individual creation (27%) and from other sources (4%)
5. The objective of the science, most samples were formulated clearly (77%). The rest weren't (23%).
6. Availability of equipment / materials, most samples was satisfied enough (70%). The rest said "not satisfied enough" (19%) and 11% was completely satisfied.
7. The involvement of teachers, mostly said it was very high (64%). The rest said low (27%) and some said not involved (9%)
8. Foothold during the activity, most said "often" (60%). The rest said "sometimes" (26%) and always (14%)
9. Guiding the way of doing science experiments. Most samples said "often" (68%). The rest said "sometimes" (24%) and "always" (12%)
10. Guidance to children who lack of ability, most samples often giving the guidance (74%). The rest said sometimes (15%) and always (11%)
11. Evaluating children in science activities, most samples often giving evaluation (64%). The rest said sometimes (27%) and never (9%)
12. How to evaluate the activity of science, most samples shows it with evaluation on the performance (44%). The rest on the observation (37%), employment (37%), portfolio (11%), and others (8%)
13. Child's interest in science activities, most said it was high (74%). The rest said it was moderate(16%) and low (10%)

The data obtained from the survey results regarding the implementation of the measurement of learning science in kindergarten:

Science Lesson Steps	Digging Ideas and Limiting Problems		Preparing Experiment					Doing experiment and observation		Analysing and concluding		Creating a display
	Digging ideas	Limiting problems	Preparing materials/ tools	Introducing material/ tools	Announcing rules	Predicting results	Distributing worksheets	Doing experiments	Doing observations	Doing analysis	Making conclution	Creating a display
The number of kindergarten	21	35	45	6	15	1	3	60	19	43	5	-

Here are the data obtained from the survey results on barriers to the implementation of learning science in kindergarten:

1. Lack of Reference books about science
2. Less support from media
3. Lack of Funds
4. Lack of tools / materials for science experiments
5. Lack of knowledge about science educator
6. Teacher aids in science activities is very less
7. Children are not able and not willing to do science activities
8. Assess the activities became difficult
9. Hard to find the right activities for kids
10. Lack of time for activities
11. Guidelines for conducting science does not exist

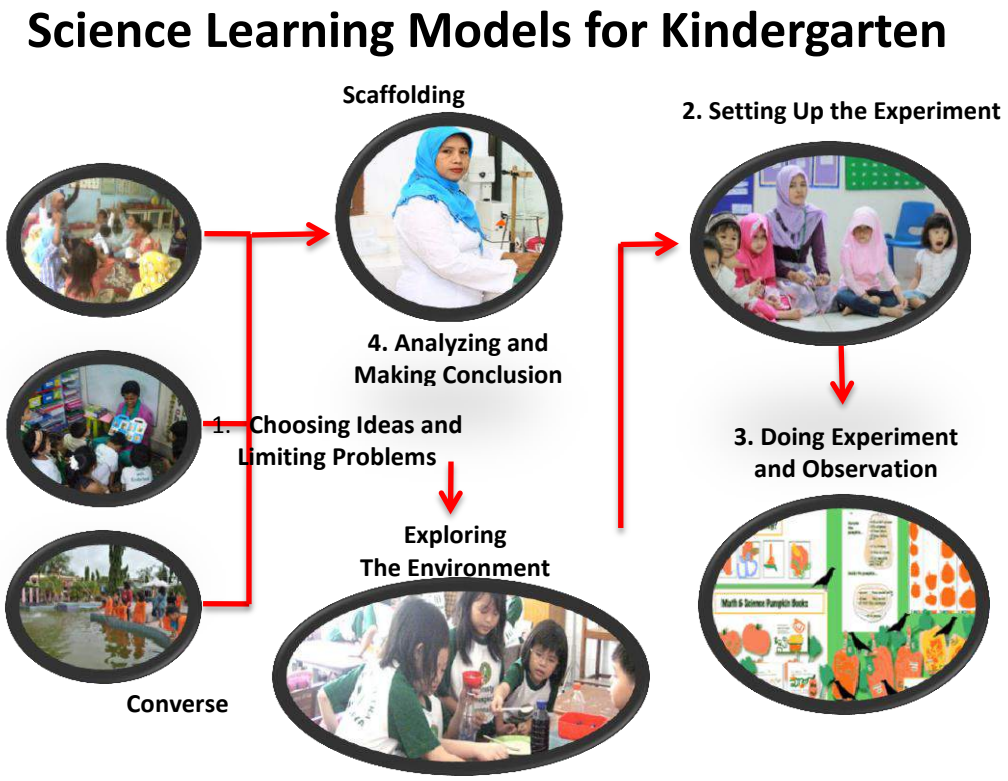
Based on survey data and references about learning science, then science learning guide prototype was formulated through following format:

1. Introduction
2. CHAPTER I Introduction
3. CHAPTER II Principles of Learning Science for kindergarten
    a. How Children Learn Science
    b. What to Do in Teaching Science
    c. Should experienced by children in Learning Science
4. CHAPTER III Learning Materials Science for kindergarten
    a. Indicators of Learning Science in Kindergarten Curriculum
    b. Science concepts Learned in Kindergarten
    c. Examples of Learning Materials Science for kindergarten
5. CHAPTER IV Science Learning Strategies for kindergarten

Thereafter the is about to be tested in a kindergarten several times while revision was made based on the reflections of teachers who is doing that of science learning. At the end, a final product obtained with the core of guidelines called "science learning strategies in kindergarten":

1. Choosing ideas and limiting problems
    a. Converse
    b. Giving foothold (Scaffolding)
    c. Exploring the environment
2. Setting up the experiment
    a. Prepare materials and required tools
    b. Introduce the tools and materials to children
    c. Explain to children the rules of the experiment
    d. Invite children to make predictions or forecasts
    e. Ask children to fill out a worksheet
3. Conducting the experiment
    a. Conducting demonstrations
    b. Ask children to do their own
    c. Invite children to make observations
4. Perform analysis of the experimental results
5. Making science display

Those can be described from the diagram as follows:



4. CONCLUSION

1. Early childhood have had the instinct to know and investigate anything they want to know from myself dam environment.
2. Teaching science for early childhood doesn't mean giving experimental result or the result of investigation as been done by others, it alone will absolutely kill creativity and their instincts as investigator
3. Teaching science for early childhood science experiments might follow the procedures performed by a scientist, but its level needs to be adjusted with the level of child development. This way is will make the kids to become amateur researchers which in the end will help developing potency of children as future researcher.
4. Science learning for early childhood must have accompanied with fun atmosphere.
5. Teachers can follow guidance which made for science learning, but the creativity of the teacher is still needed in order to engage children in learning science while maintaining the happiness of children.

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