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Monitoring Children Cognitive Development Activities AEPS®: 3 - 6 Embedded in the Teaching and Learning Early Science with Inquiry

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Abstract

Science is not only consisting of knowledge and information, it is also a process of research and finding answers, which is called inquiry. Inquiry process is one of the approaches in teaching and learning early science. Inquiry learning approach refers to the student-oriented learning approach which encourages one's active participation in the exploration of new knowledge. The instrument of cognitive development assessment AEPS®: 3 - 6 (Assessment, Evaluation & Programming System®: 3 - 6) is a set of intervention, assessment, and program for typical and non-typical children from 0 - 6 years old. This study aims to obtain a clear picture on the cognitive development activities, which is implemented by teachers in teaching and learning early science by using inquiry approach. The study which involves children from age five to six years old is conducted under naturalistic observation method. The observation shows that activities using the concept application criteria are the activity element which is mostly used. Even though this module is using the inquiry approach and is provided with teaching aids, the activity under the playing criteria could not be observed throughout all the four observations conducted.

Keywords

Preschool, Early Science, Inquiry, Authentic Assessment

1. Introduction

This paper discusses the data recorded from an enquiry based science activities among preschoolers; activities were carried out by teachers guided by a module.

The main purpose was to observe the criteria that could potentially be nurtured among young children whilst they perform the activities. Although the module was named as "inquiry", its scientific evidence on the appropriateness of usage among preschoolers was not yet established at the time of study. Lacking in teachers' knowledge and readiness also is factors that could lead to inefficiency of the delivery. It is important to gather data that may assist in promoting or otherwise improving the module for the benefit of children's cognitive abilities specifically, and holistic development in general. The scope of the current study focuses on the criteria/skills that can be observed and rated using an instrument known as AEPS®: 3 - 6.

Science learning from early age (early science) is significant and needs to be emphasized during early childhood education. Research conducted finds that children as early as childhood are capable of learning early science and the learning effect is related to the children's readiness to attend school and the academic excellence (Arnold, Fisher, Doctoroff, & Dobbs, 2002; Guo, Piasta, & Bowles, 2015). However, people's perception towards science is more prone to the knowledge of scientific facts, like exams that require a lot of memorizing. Science subject is often seen as a tough subject for students in Malaysia thus giving a misconception towards the subject (Phang et al., 2014). Whereas science learning especially for children should focus not only on memorizing the facts, but on an exploration experience and fun learning (Seefeldt, 2011). When experience like this exists, then only the learning of scientific facts through the application of process skill of scientific learning such as asking questions, conducting research, observation and the rest will follow (Seefeldt, 2011).

Early science learning in children starts naturally since from baby as they explore their environment. The stimulation from the children's environment is strongly connected to their cognitive development. The recent research on brain's development or neuroscience has proven the importance of early stimulation since infancy to stimulate brain cell development and connection (Seefeldt, 2011). Lack of this stimulation can cause reduce in the children's potential development and not reach the best rate of growth (Hadzigeorgiou, 2002). Hence, activities of early science learning that helps to promote cognitive development among children which is rich with stimulation need to be made to exist in kindergarten and preschool. Parents also need to play their role by preparing conducive environment at home so their cognitive development potential can be maximized.

In the context of Malaysia, many parents are starting to realize the importance of preparing a conducive environment for children's learning and growth. This can be seen in the trend of increasing number of children being registered in preschool every year (Children Statistics Malaysia, 2020). Even though this increase is overwhelming, there are still few challenges that need to be overcome in the effort of preparing the best teaching and learning (T & L) early science experience for children.

One of the obstacles identified is the teacher's attitude and knowledge in providing the required experience in T & L early science. The research from Zurida Ismail and Hashimah Yunus (2004) found that almost 40% of kindergarten teacher has a wrong perspective towards early science subject other than facing difficulties to master the content of the syllabus for them to teach the children (Balakrishnan, 2002). The factor of lack implementation of High-Level Thinking (HLT) in T & L and the lack use of teaching aids affect the teaching and learning (Balakrishan, 2002). The lack of recent teaching aids causes the learning process to focus more on using pencil and exercise books hence less stimulating the children's mind. Other than that, limited learning opportunities and no quality early science learning from inexperienced teacher will cause a lack of early science learning knowledge learnt by children (Piasta, Pelatti, & Miller, 2014).

This is one of the obstacles that need to be overcome if the country wishes to position the quality of the country's educational system as equal as the other prestigious educational system from all over the world (Kementerian Pendidikan Malaysia, 2013). The aim or the benchmark of the education quality set is to target Malaysia to be on the top one third in international assessment like TIMMS (Trends in Mathematics and Science Study) and PISA (Programme International Students Assessment) within 15 years (Kementerian Pendidikan Malaysia, 2013). TIMMS assessment mentioned is a test closely related to the understanding and science application in daily life. Hence, the effort to better the quality of the country's education should start from basic preschool and kindergarten. Thus, research on making better early science activities in kindergarten or preschool needs to be conducted. One of it is by having a research regarding the activities in children cognitive development criteria which is implemented in early science T&L. In the context of this research, inquiry early science learning: through the learning module The Little Scientist (TLS) was conducted. The research was conducted in a private kindergarten in Shah Alam, Malaysia to obtain a clear description on children's cognitive development activities that exist through inquiry early science learning. This research contributes to the repertoire of knowledge about children's cognitive development via teachers' practice in teaching and learning early science, especially in Malaysia.

2. Literature Review

2.1. Cognitive Development According to AEPS®: 3 - 6 Criteria through Early Science Learning

The domain of scientific learning does not only cover knowledge and information on facts; but a learning process that teaches scientific skills. As what Albert Einstein mentioned," Science is a process of knowledge exploration" (Renner & Marek, 1988). Hence while researching the process of knowledge exploration that takes place in human mind, the author research on the findings from neuroscience and psychology research to understand how the early science concept is built in children's mind from early age; other than observing the criteria that

needs to be present in the activity that encourage children cognitive development.

Neuroscience and psychology research conducted shows that learning in human starts as soon as the baby opens their eyes for the first time. Human since from baby starts to interact with the world around them to explore and create a world that they can understand (Gisburg, 2007). Children until the age of five are always looking for ways to understand the world around them by using their senses and by interacting through social interaction language, calculation, reasoning of incidents, as well as problem solving angle (Shonkoff and Philips, 2000). From this process, they build understanding and concept about the things surrounding them. Hence, it is very importance for parents and teachers to provide adequate opportunity for children to experience exploration activities to train their inquiry skills, thinking and reasoning. The opportunity can be created through early science teaching and learning activities in preschool or kindergarten.

There are various methods that can be used in determining whether the children cognitive development activity exists or not in each process of teaching and learning in kindergarten or preschool. One of it is by cross referencing the criteria from the instrument of children cognitive development assessment. In this research, the instrument of cognitive assessment AEPS®: 3 - 6 (Assessment, Evaluation, & Programming System: 3 - 6); which is a set of evaluation, interval, and program for typical or the ones with special needs children from 0 - 6 years is used (AEPS, 2016). There are eight categories of strand activity criteria observed which is the ability to understand concept, categorise, order, tell stories, problem solving, playing, mathematical problem solving and reading (AEPS, 2016).

As a conclusion, children cognitive development needs to be encouraged since birth. One of it is by existing early science activities by implementing the elements outlined in the AEPS®: 3 - 6 instrument of cognitive development.

2.2. Inquiry Learning Method

In Malaysia, the implementation of early science learning in early childhood education is different according to individual kindergarten or preschool. Even so, the Ministry of Education (MoE) has come out with a guideline according to the National Preschool Standard Curriculum (NPSP) for all the kindergartens to ensure the learning outcomes reach the standard and the hopes of the country's education. In terms of implementing the content of NPSP, some kindergarten uses specific modules or learning books to deliver and execute early science learning to children.

Through this research, early science learning module The Little Scientist (TSL) has been chosen as the focus of this research. The module is founded in the year 2001 by a chemical engineering graduate whom in the beginning was only helping his own child preschool learning who did not enjoy learning in

kindergarten. The module generated uses inquiry skill approach by providing a complete teaching aid, experimental techniques materials, a comprehensive lesson plan guideline and an interesting exercise book.

TLS learning module is one example of early science learning module which applies inquiry learning approach. Teaching methodology through inquiry method is a learning approach that has been proven effective to convey any science related knowledge (Warner & Myers, 2008). According to the agency National Research Council (NCR) in the United States of America, basic ability and understanding in inquiry skill has its different level according to age and individual's cognitive development (Olson S. dan Loucks-Horsley S, 2000). Generally, inquiry skill can be divided to three levels. Structured inquiry, guided inquiry, and open inquiry. Through structured inquiry approach, all complete procedure for someone to learn science facts; for example, research objective, hypothesis and procedures for experiment are prepared. One who goes through all the procedures will reach a conclusion that is aligned with the required learning output (Zion, Cohen, & dan Amir, 2007).

Guided inquiry method is another level of inquiry learning which is higher than the structured inquiry. Through this approach, a teacher is a guide for their students to explore by providing problems to be solved. Students then need to figure out a method of solving the problems through experiment. Through guidance, learners can learn new knowledge and understanding out of curiosity or inquiry which starts from a given problem (Zion, Cohen, & dan Amir, 2007). The highest level of inquiry learning is open or free inquiry. For this level, students can independently plan all the scientific process required for a research to obtain a new science fact (Zion, Cohen, & dan Amir, 2007). At this rate, a teacher only plays a role as setting up a framework of the concept in the research conducted. Basically, science learning method through inquiry approach enables one to think through and come up with questions, conduct observation, hypothesis, data collection and then develop a new scientific knowledge (Opara, 2011).

There are many advantages obtained from inquiry learning method. Some of them are students become more spirited and motivated to study in class (Alake-Tuenter et al., 2012; Suduc, Bizoi, & Gorghiu, 2014). Student's achievement is seen to be better and increased when they go through the inquiry learning process (Md Shah, 2012). In addition, critical thing can be improved among students when inquiry active learning is implemented in class (Thaiposri & Wannapiroon, 2005; Umar & Maswan, 2006).

As a conclusion, inquiry learning is a good science learning method to be implemented due to the pros that can be obtained from the approach of this learning. However, there are still some downsides of the research conducted towards the activities that can be done especially in the context of inquiry approach in early childhood education. Hence, the research done is to explore those areas deeper.

3. Methodology

3.1. Sample

The exploratory case study design has been chosen by the researcher to gather information and a better description of the activities of cognitive development which is implemented in the early science teaching and learning process in kindergarten. The population of the research is children at the age of 5 and 6 years old in Shah Alam whilst intended sampling method is used to choose a kindergarten sample that uses early science learning module The Little Scientist to fulfill the objective of this research. The aim of intended sampling is to obtain a research sample that is packed with information regarding the things to study (Gall et al., 2005). From the sampling technique, a kindergarten has been selected by the researcher to observe the early science teaching and learning session through the TLS module.

3.2. Instrument

For the process of data collection, the instruments Assessment, Evaluation, & Programming System®: 3 - 6 (AEPS®: 3 - 6); is a set of intervention, assessment, and program for typical and non-typical children from 3 - 6 years old. AEPS® instrument in this research is an instrument that has been adapted in Malay language and has been suited to the sociocultural context of the people through an action research conducted by Yunus (2013). The research conducted since the year 1986 has proven that AEPS® instruments have high validity and reliability. For instance, is a research from Bagnato et al. (2007) which combines all AEPS® valid and reliable research from the year 1986-2005 which verifies that AEPS® does have high validity and reliability.

3.3. Procedure

Before the research is conducted, the authorization to observe and record the early science T & L session has been obtained from the parents and the kindergarten. Nevertheless, researcher is only allowed to do an audio recording to fulfil the management's request and due to the ethics of child protection. Data gained from this research is based on naturalistic observation throughout live early science T&L apart from a narrative field note that has been taken throughout the process. During the observation, researcher acts as an observer who is not involved in the teaching and learning process. All the teaching and learning sessions observed was handled by four different teachers who attended a special course to conduct the learning module. The course is conducted by the kindergarten's management and the TLS early science learning module provider.

Based on the results of the naturalistic observation done by the researcher, activities that meet the criteria of AEPS® instrument for children cognitive development is reviewed and recorded. A naturalistic observation is used in this

research so that the observed children's behaviour is not affected by external factors such as exam environment or time constraints which occur when any exam is conducted. All the factors can affect the validity of the research results (Nagle, 2000). Thus, naturalistic observation is conducted throughout all four observations.

Table 1 shows the mapping of objective of study, the instrument used, and procedure of data analyses. During observation, researchers collected the data by taking field notes and/or video/audio recording and then those recorded data was used to rate AEPS®:3-6 criteria for cognitive abilities.

4. Data Analysis

For the data analysis process, the activities information which promotes the children's cognitive development from the AEPS®: 3 - 6 instrument checklist is analyzed with descriptive statistic as well as qualitative. Table 2 is the detailed observation that has been conducted.

From the instrument AEPS®: 3 - 6 some criteria out of the eight categories strand observed which is understanding concept, categorizing, following orders, retelling, problem solving, playing, mathematical problem solving, and the ability to read. For every criterion stated, there are specific activities outlined in the AEPS®: 3 - 6 cognitive development instrument. Each activity has been identified by the researcher during the observation and has been recorded whether the activity is conducted or not in the observed early science T & L. The result of the

Table 1. Objective, instrument, and analyses.

Objective	Instrument	Analysis
Identify activities that promote the cognitive development of children found in learning and teaching (T&L) based The Little Scientist module which uses the inquiry and hands-on approach.	AEPS cognitive development instrument®: 3 - 6 years. Strand 1: Understanding of concept Strand 2: Categorizing Strand 3: Follow instructions Strand 4: Retelling events Strand 5: Problem solving Strand 6: Play Strand 7: Mathematics problem solving Strand 8: Reading	Data was analysed quantitatively. Analysis by checking activity based on AEPS criteria Quantitative statically scripted by calculating the percentage for each strand of activity.

Table 2. Detailed observation conducted.

Observation Number	Learning Theme	Child's Age	Number of children	Observation Period (Minute)
1	Fruits	5 and 6 years	60	35:47
2	Magnet	6 years	21	80:51
3	Temperature (Hot and Cold)	5 years	22	54:13
4	Water cycle	6 years	25	60:00

observation towards the T & L activity in all four observation are as shown in Table 3 (according to the eight strand category activities in the AEPS®: 3 - 6 cognitive development instrument).

4.1. Overall Descriptive Statistical Analysis

Based on the observation conducted, it is found that the activity in the first strand and the third strand which is understanding concept activity and following order activity; was one of the activities implemented in all observed early science T&L with the percentage of 57% and 58% individually. The least implemented activity out of all four T & L process observation is playing activity (0%), reading (9%), retelling (17%) and mathematical problem solving (19%). Figure 1 is the percentage bar chart for all the activities based on strand.

Table 3. Results of observation conducted.

Strand Category Activities	Understanding Concept (7 criteria)	Categorising (3 criteria)	Following Orders (3 criteria)	Retelling (2 criteria)	Problem Solving (5 criteria)	Playing (5 criteria)	Mathematical Problem Solving (4 criteria)	Reading (8 criteria)
First Observation (Fruits)	6/7 (86%)	0/3 (0%)	1/3 (33%)	0/2 (0%)	0/5 (0%)	0/5 (0%)	0/4 (0%)	0/8 (0%)
Second Observation (Magnet)	4/7 (57%)	2/3 (66%)	2/3 (66%)	1/2 (50%)	2/5 (40%)	0/5 (0%)	1/4 (25%)	3/8 (38%)
Third Observation (Temperature)	3/7 (43%)	1/3 (33%)	1/3 (33%)	0/2 (0%)	4/5 (80%)	0/5 (0%)	2/4 (50%)	0/8 (0%)
Fourth Observation (Water cycle)	3/7 (43%)	0/3 (0%)	2/3 (66%)	0/2 (0%)	3/5 (60%)	0/5 (0%)	0/4 (0%)	0/8 (0%)
Overall Percentage (based on strand)	16/28 (57%)	3/12 (25%)	7/12 (58%)	1/6 (17%)	9/20 (45%)	0/20 (0%)	3/16 (19%)	3/32 (9%)

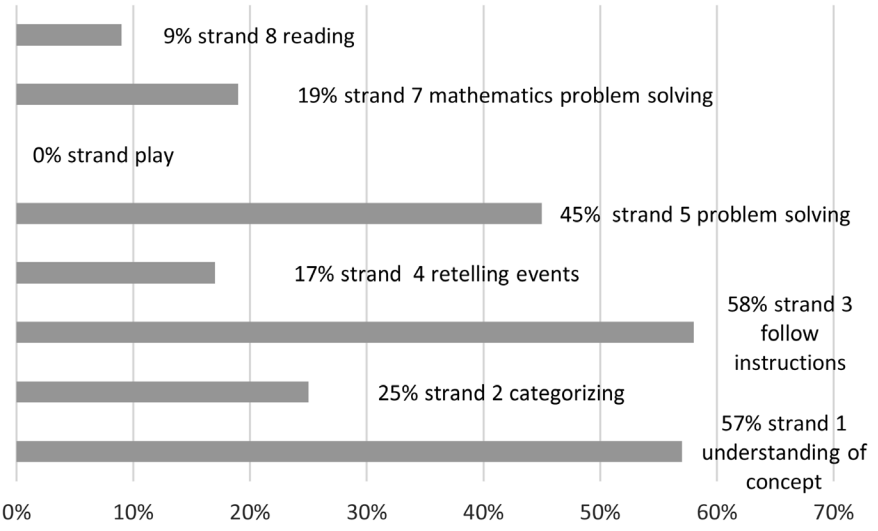

Figure 1. Bar chart for the results of cognitive development activity implemented (based on strand category).

4.2. Analysis According the Strand Category Activity

1) Understanding Concept Strand

Based on Table 3, overall, strand category activity of understanding concept is the most implemented activity in T & L. If seen one by one based on observation, this strand category is the highest in the first T & L observation, which is themed fruits. In the first observation, teacher emphasizes the different concept between the type of fruits with seeds, color of the fruits, the taste of the fruits and its shape. The activity is implemented through questioning technique towards the children. For example:

Teacher:	What fruit is this? Who knows?
Children:	Plum
Teacher:	Does it have seed inside?
Children:	Yes.
Teacher:	Are you sure?
Children:	Okay, aunty (teacher) cuts, we see together the seed inside.

The teacher cuts the plum into two to show the seed inside.

Teacher:	Okay, look here. Can you see the seed?
Children:	Yes.
Teacher:	Okay, so this is an example of fruits that has seed.

In the second, third and fourth observation, emphasis on understanding concept is also implemented but the percentage is not high compared to the activity in the first observation.

2) Categorizing Strand

Under the strand of children's ability to categorize, the evaluated criteria are the activity that allows children to collect an object, people or something that has a specific basic criterion (based on functions, physical attributes, and others). Activity in this strand is mostly observed in the second observation with the theme magnet. For this observation, the teacher has connected the activity of categorizing an object based on its ability to be attracted by magnet or not through questioning method and experiments conducted by children method. Questioning activity to categorize the objects is conducted with the help of teaching aid of pictures. There is no categorizing activity observed in the first observation (fruits) and fourth observation (water cycle).

3) Following Order Strand

Category strand activity of following orders is one of the strand activities with the highest overall percentage (58%) apart from being an activity that is highly implemented in the fourth observation (water cycle: 66%) and second observation (magnet: 66%). If observed from the criteria that have been set, all four observation has at least one activity under this category; and all activity are under the category following orders or more activity that is not a routine. For instance, in the fourth observation (water cycle) before the teacher demonstrates the experiment, the teacher gives out instructions:

Teacher: Okay, those from that side, can you come to this side?
[Children start to move.]
Teacher: Uwais can sit beside Ahmad Faris.
[Uwais moves based on the instruction]
[Teacher tries to get the children's attention.]
Teacher: Okay, listen, do you want to do the experiment? Sit down. If you cannot see, sit down on the floor. Or bring you chair.
[Children obeys the instruction]
For the second observation (magnet), during the process of conducting the experiment.
Teacher: Okay. You guys want to try for yourself? Okay, sit down. We will do line by line. Be in your line first or else your line will not be called.
[Children line up in rows]
Teacher: Okay, first group stand up.
[First group of children stands up]
Teacher: Okay, each person in the group can try one object on the table. The object that can be attracted by magnet, you put here (right), the object that can't be pulled by magnet, you put here (left).

This proves that in T & L conducted, even though the module given is based on the inquiry concept which is a learning environment that encourages children to explore on their own, but the reality in the early science teaching level, teacher still plays an important role to give out instructions to the children to do something or explore any situation.

4) Retelling Strand

This strand category is one of the activity categories with the lowest percentage if analyzed as a whole (17%) and one by one through observation. There is only one observation out of four observations conducted which implemented the cognitive development activity in the early science T & L. Retelling criteria has been successfully implemented in the second observation(magnet) through retelling method to the teachers while answering questions in the exercise book. Nevertheless, the cognitive development activity was not observed in other observations even though the exercises in exercise book are implemented in the observation. For example, in the third observation about temperature, even though the children completed the exercise in an exercise book, there is no activity that fulfills the criteria of retelling.

5) Solving problem strand

Activity below the problem-solving strand is highly observed in the third observation (80%). Some criteria of activities under this strand are to encourage children to find a solution of a problem and allow children to make a statement and find answers to the given question (which requires reasons for object, situation, and people). For instance, in the third observation, the teacher implements the activity (in the problem-solving strand); which allows children to make as-

sumption on the upcoming event through the question technique as follow:

Teacher: If you have an ice cream, and we put the thermometer in the ice cream, what do you think the temperature is? Is it high or low?
Children: Low.
Teacher: If you have a hot milo, is it high temperature or low temperature?
Children: High.

In the second observation, activity of making assumption before any event is implemented before the experiment is conducted. For instance:

Teacher: Can you take out the paper clip from the water without making your hands wet?
Children: Yes.
[Thus. the experiment to extract the paper clip out of the water using magnet is conducted]

6) Playing Strand

In this observation, the experiment conducted is not considered by the researcher as playing because the children are completing an experiment guided by the teacher step by step. It is because, the definition of playing by Margaret Kernan (2004) stated in the National Play Policy, is a behavior chosen by the children, driven by their desire, wants, and inner needs. Hence, the playing strand in all four observation could not be observed due to all experiments are by following the teacher's instruction. This could be improved by providing more room and opportunity for the children to independently explore with the teaching aids and without the teacher's instructions.

7) Mathematical problem-solving strand

Even though the observations are for early science subjects, but mathematical elements could be implemented in T & L. The observation result of all four-learning session has concluded that this activity under this category strand in unlikely implemented with only 19% execution. Out of two learning session observed related to this element, only the criteria of identifying number is implemented. Both involve the teacher giving out instructions to the children to turn for a certain page number of the exercise book. This provides the opportunity for children to identify the numbers in the book to match the given words.

Other criteria under this strand are counting object, unfortunately could not be observed regardless of the researcher thinks that there are many opportunities to implement this activity throughout the T & L session. As an example, while doing the magnet experiment, after the children categorize the magnetic and non-magnetic object; the teacher could have asked the children about the number of objects in each category.

8) Reading Strand

The activity in reading strand is less likely to be implemented in all four early science T & L observed (9%). The criteria under this strand are only observed for

the second observation (magnet), when the teacher guides the children to answer questions in the exercise book which requires them to spell and hide the words and building up sentences by sounding the letters. Based on other T & L observation (other than second observation), the criteria of activity under this strand could not be observed due to all T & L process in mainly focusing on the emphasis of science facts understanding and still lack of implementation with the reading and mathematics element in T & L.

5. Discussion

Science has been known to scare off learners and at times deemed as uninteresting subject due to too many facts to be memorized, especially when it involves paper-and-pencil tests. However, young children can also be victimized by this kind of approach to science learning if caution is not given to the activities which are appropriate to the development. This paper intended to highlight the activities surrounding early science which were based on an inquiry module that could potentially be both beneficial and harmful to the development of preschoolers. The focus was to deduct criteria of cognitive from children's engagement or otherwise non-engagement whilst they were in the process of learning. Early science activities are supposed to nurture mainly cognitive skills, apart from other domains of development, and therefore, it is important to focus on cognitive criteria at this stage of study. Future research could focus on specific skills that are lacking among teachers, and search for training content to improve teachers' practical knowledge so that cognitive criteria that were not promoted as found in this study like play strand could be more observable.

As the results of the study, the activity of understanding concept is the most emphasized activity by the teachers in all T & L sessions conducted. The activity mainly involves the teacher's role to introduce the science concepts and the children will responds (individually or collectively) through the teacher's question. The activity is conducting through describing teaching technique. The technique is used to explain something to children by describing the look, taste, sound, and movement of an object (Macnaughton & Williams, 2008). The teaching technique uses words and symbolic thinking ability in describing a concept to children (Macnaughton & Williams, 2008). Thus, the teacher could improve the effectiveness of the teaching technique by using an understandable and simple language, and cross checking the student's understanding after the explanation.

From the researcher's point of view, the high number of students impacted the effectiveness of the T & L conducted. For instance, in the first observation, only the concept introduction activity and following order are implemented successfully compared to other observations which implemented more cognitive development activity in T & L. This is aligned to the research result which finds that high ratio of teachers to students will affect the effectiveness of the learning process in class (Chingos & Whitehurst, 2011). Hence, the number of children

could be reduced to maximize the effectiveness of the T & L conducted.

Playing activity is the least implemented activity out of all four observations performed. This is in line with other research results that find that playing time in kindergarten is reduced to spare extra time for the academic learning that is more rigid, and heading to adult's learning (Stipek, 2006; Golinkoff, Hirsh-Pasek, & Eyer, 2004). Nevertheless, various researches have shown that playing activity has its good side to physical, social, cognitive and language development (Bergen, 2002; Garvey, 1993; Vygotsky, 1976). One of the factors why this is happening is due to the emphasis of reading, writing, and counting in T & L process, due to the push from parents; other than the factor of lack of understanding on human development concept and the benefit of playing to children (Jaslinah Makantal, 2012). Thus, many exposure and training need to be done not only to teachers, but also the parents on the importance of integrating playing activity in children learning process.

6. Conclusion

In a nutshell, few cognitive development activities based on AEPS®: 3 - 6 criteria are observed in the early science T & L using inquiry approach based on TLS module. The activity under the category *strand of understanding concept and following order* is mostly observed, while the activity under the *playing strand* could not be observed in all four T & L processes. Even though inquiry approach was used in the structured inquiry learning, children should have more opportunities to explore the teaching aids on their own. There are still more efforts to be done to implement the playing element in the early childhood education despite of the existing module and teaching aids are provided.

Play has been lacking in the process of early science inquiry found in this study. As a practical approach for any non-researcher or practitioners, we suggest that teachers could arrange the activities to less structured, more hands-on, and to allow for two-way communication to take place during T & L. Teachers could apply (specialist) techniques of techniques of teaching that allow learners to be more engaged during the activities like using the questioning techniques that encourage more than one answer from the kids. Other than that, module developers must provide detailed video tutorial that emphasizes on the methods of promoting cognitive skills through appropriate teaching techniques.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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