

# An Analysis of the Criteria and Effectiveness of Using Teaching Aids in Preschool Science and Technology Components in Malaysia

Suppiah Nachiappan<sup>1</sup>, Zaharah Osman<sup>2</sup>, Nurulhuda Md Hassan<sup>3</sup>, Norly Jamil<sup>4</sup>, Hashimah Hussein<sup>5</sup>, Mastura Othman<sup>6</sup>, Sandra Suffian<sup>7</sup>

<sup>1</sup>Faculty of Human Development, Sultan Idris Education University  
Email: [suppiah@fpm.upsi.edu.my](mailto:suppiah@fpm.upsi.edu.my)

<sup>2</sup>Faculty of Human Development, Sultan Idris Education University,  
Email: [zaharah@fppm.upsi.edu.my](mailto:zaharah@fppm.upsi.edu.my)

<sup>3</sup>Faculty of Human Development, Sultan Idris Education University  
Email: [nurulhuda.mh@fpm.upsi.edu.my](mailto:nurulhuda.mh@fpm.upsi.edu.my)

<sup>4</sup>Faculty of Human Development, Sultan Idris Education University, [norly@fpm.upsi.edu.my](mailto:norly@fpm.upsi.edu.my)

<sup>5</sup>Faculty of Human Development, Sultan Idris Education University  
Email: [hashimah.h@fpm.upsi.edu.my](mailto:hashimah.h@fpm.upsi.edu.my)

<sup>6</sup>Faculty of Human Development, Sultan Idris Education University  
Email: [mastura0984@gmail.com](mailto:mastura0984@gmail.com)

<sup>7</sup>Faculty of Human Development, Sultan Idris Education University  
Email: [sandrasuffian@gmail.com](mailto:sandrasuffian@gmail.com)

To Link this Article: <http://dx.doi.org/10.6007/IJARPED/v7-i1/3902>

DOI:10.6007/IJARPED/v7-i1/3902

**Published Online:** 21 March 2018

## Abstract

This research aims to identify the usage of teaching aids in the teaching of the Science and Technology component in preschools in order to increase the cognitive development of students to become creative, innovative and informative. This qualitative research is conducted in two phases involving 20 preschool teachers from 3 districts in the state of Perak, Malaysia. The data derived from this research is through observation and structured interview methods using the Hermeneutic method in analyzing the research data. The findings from this research for phase 1 concern the analysis of the need of an early draft of the content for a guidebook on the usage of teaching aids for preschool Science and Technology. The guidebook that has been come up with is distributed to the research respondents in order to test the effectiveness of its implementation in increasing the cognitive development of preschool students in the 2nd phase of the research. The overall findings of the research shows that there exists a variety of teaching aids which is made use of by preschool teachers in the Science and Technology component for both phases. Among the types of teaching aids used include computers, concrete objects, pictorial charts and flashcards. Nevertheless, preschool teachers are still seen to have a low level of skilled expertise in the aspect of choosing teaching aids and its implementation in a creative, innovative and informative way.

Additionally, it is recommended that teachers be provided with sufficient training and skills in the aspect of the creation and usage of teaching aids in order to enhance the quality of the teaching process, especially in the preschool Science and Technology component.

**Keywords:** *Preschool, Teaching Aids, Component of Science and Technology, Hermeneutic Method*

## Introduction

### Background of the Research

The preschool education in Malaysia is a program that prepares a teaching experience to students ranging from ages 4 to 6 in the time period of a year or more before enrolment in Year 1 (at age 7). In the Malaysian context, preschool education has undergone a substantial transformational process with regards to its curriculum standards which is known as the National Standard Preschool Curriculum. The Education Ministry in Malaysia have brought on a holistic change by taking into account the aspects involving content, pedagogy, financial allocation, time, method, analysis, teaching materials and management in the National Standard Curriculum based on the current preschool curriculum (Education Ministry Malaysia 2010).

The Science and Technology component is the main focus of this research, whereby it encompasses early science, early mathematics and building activities using objects such as blocks and the usage of ICT (Education Ministry Malaysia 2010). Through the introduction of early science, preschool students will be able to explore their surrounding environment using their physical senses and basic tools. The basic skills which serve the scientific process include observational and measuring skills using standard measurements, comparing and categorizing which can inculcate and develop during the exploration process. The implementation of early science also provides an opportunity for preschool students to involve themselves in the building process using objects resembling blocks, whereby through this activity, students get to learn about the concept of relating, early mathematics, as well as the enhancement of their creative capacity and basic motor skills.

In the context of this research, the teaching process involving teaching aids in the science and technology component is the main focus. The teaching of science and technology is closely related to the responsibility of preschool teachers as the deliverer of knowledge and the effectiveness of teaching in aiding preschoolers to learn depends on how far teachers are capable of achieving the objective of the teaching process in helping students learn what is being taught (Zamri, Juliawati & Nik Mohd Rahimi, 2009). Sharifah Nor and Aliza (2011) state that before commencing on the lesson, it is imperative for the teacher to prepare a lesson plan and teaching aids. Teaching aids are created by teachers according to their creativity, in line with the objectives of the lesson given by the national standard syllabus. Johnston (2014) claims that teaching aids are also suitable and beneficial to the development of preschoolers. Concrete objects that are authentic and meaningful are provided to encourage the communication and imagination of students, consequently serving to attract the interest of the students.

Therefore, this research pays attention to the usage of teaching aids as a tool of enquiry which enables students to establish a connection between teaching aids and the ability to

generate independent questions. According to Lohfink (2012), the recommended techniques in promoting the usage of teaching aids are as follows:

- i) Introducing preschool students to an independent interactive relationship with teaching aids and the enquiry of questions pertaining to the teaching aids (student-centered teaching).
- ii) Teaching aids that are perceived as creative communication media in a critical and innovative way during the teaching and learning process towards the process of independent and systematic questioning, from simple to complex in accordance to the capacity of the preschoolers.
- iii) In groups, two students investigating teaching aids to obtain further information through discussion towards establishing effective communication in order to identify the questions related to teaching aids collaboratively.
- iv) Encouraging the reading and free enquiry in order to decide on the information which is investigated through the enquiry of teaching aids which is used by preschool teachers.

### **Statement of Problem**

Preschool teachers play an important role as a catalyst in the development of children through the teaching and learning process in class. In line with this view, the Malaysian Education Ministry (2010) have strived to outlining a few standards in the teaching and learning process, as well as the creativity domain in explaining what needs to be known and done by preschool teachers during the teaching and learning period. Among other things, the standards emphasize on the aspect of learning based on the needs of the curriculum as well as the needs of children. The learning process making use of an approach appropriate to the learning level of the children also serves to inculcate creative and innovative thinking among preschoolers during the teaching and learning process.

Lihanna (2005) states that most of today's educators are still very much identified with the traditional pattern of teaching which highlights a more didactic and teacher-centered approach to teaching and learning. What she claims to be more worrying is that the background of teacher training and practices received by these teachers do not seem to influence their pedagogic values in any direct manner in the classroom. The concept of development appropriate to the teaching practices outlined in the National Preschool Curriculum Standard is still not imbibed satisfactorily or even practiced efficiently by teachers. A misconception and preconception of teachers regarding their pedagogic and teaching practices hinders the effectiveness of the teaching and learning process in students' early education.

A shallow level of knowledge in terms of practical aspects can distort the planning and management of preschool education as well as the learning process of the children (Rohaty, 2003). In the context of the teaching of preschool mathematics, a research by Copple (2004) reveal that preschool teachers are not comfortable teaching Mathematics compared to other subjects as they are not sure on the appropriate approach to make use of in the classroom.

The research result of Balakrishnan (2002) show that preschool teachers tend to possess a low level of confidence in executing critical thinking practices in the classroom although they have been inducted into courses conducted by The Education Ministry of Malaysia.

Balakrishnan (2002) goes on to claim that teachers lack the initiative to inculcate enquiry techniques and the usage of teaching aids in the teaching and learning process.

Research from Suppiah and Norwahida (2014) concluded that preschool teachers are capable of planning a daily lesson and an effective teaching approach which is suitable to the level of students' development. Despite that, the lack of creativity in planning the lesson plan is detected. The approach involving the teaching process as well as the methods that are less efficient will lead to a slow development in students' cognitive process. In contrast, a research by Al-Thani (2010) highlight those preschool teachers fail to integrate creative thinking skills in the teaching process.

According to Erik and Dawson (1995), there is research which shows that teachers are more inclined to take a liking to students who do not portray creative traits, or students who are passive and impartial towards the teacher. Findings from a research by Jingbo and Elicker (2005) show that teachers tend to respond negatively in 80% of incidents that are observed when preschoolers generate their original ideas.

According to Smith et al., (2012), ICT can enhance motivation to children, get their attention and the teachers can use ICT to enrich learning environment. According to Goudmin (2008), IWB can motivate the children to learn and enhance cognitive thinking with creative learning opportunities, concept and genuine abstract ideas.

According to Norasiah, Nor Risah and Rosnah (2013), teaching aids help teacher to achieve any learning objective effectively. The selection of the teaching aids with the activities in teaching and learning environment enhance teachers to deliver information effectively and systematically.

According to Zuri and Azman (2015), emphasize to be given to the teaching aids which involve activities with concrete objects. Apart from this, training involves musical and art instruments enhance the enthusiasm of children. Thus, teaching aids such as pictures and charts enriches thinking styles of children. Teaching aids usage like concrete objects and audio visual devices such as television, picture cards, lap tops and smartphones are important in pre-school teaching and learning process.

Therefore, it is necessary to carry out this study to determine the criteria and effectiveness of using Teaching Aids in Pre-school Science and Technology Components in Malaysia.

### **Objectives of the Research**

- a. Identify the usage of teaching aids in the teaching and learning of Science and Technology in preschool
- b. Prepare a guidebook on the usage of teaching aids in the teaching of Science and Technology in preschool
- c. Test the effect of the usage of the teaching aids guide book on Science and Technology in preschool towards students' cognitive development.

### **Research Questions**

- a. What are the teaching aids used in the teaching of science and technology in preschool?
- b. How is the guidebook on the usage of teaching aids in the teaching of science and technology prepared?

- c. Is the usage of the teaching aids guidebook on Science and Technology effective in enhancing students' cognitive development?

### **Significance of the Research**

Based on the research questions and objectives of this research, this research is significant in order to perceive the effects of using the teaching aids guidebook towards the creative cognitive development among preschool children. According to the findings of this research, it shows that the teachers are using various types of teaching aids. The usage of teaching aids of electronic equipment type, flash cards or pictorial cards, concrete objects and white boards or display board shows an increase in usage. At the end of this research, a guidebook on the usage of teaching aids was prepared based on the results from observations and interviews on types of teaching aids used by preschool teachers in the teaching of Science and Technology, as well as its method of use. The effectiveness of the teaching aids guidebook was also tested and it is undeniable that the guidebook is very useful in enhancing students' cognitive development. It is hoped that the findings of this research can become a source of useful information to researchers and other relevant sectors and institutions on the usage of teaching aids and its implications on the creative cognitive development of preschoolers. This research will also enable preschool educators all over Malaysia on the ways of enhancing the cognitive level of students through the implementation of effective and quality teaching aids. This ensures the level of readiness of the educators and their interest in planning teaching activities that are more cheerful and fun.

### **Conceptual Framework of Research**

This research brings its focus on the usage of teaching aids in the teaching of Science and Technology component in preschool. Figure 1.1 shows the conceptual framework of this research that focuses on the usage of teaching aids from the creative, innovative and informational aspect. One of the results of this research involves the creation of the teaching aids guidebook in the Science and Technology component.

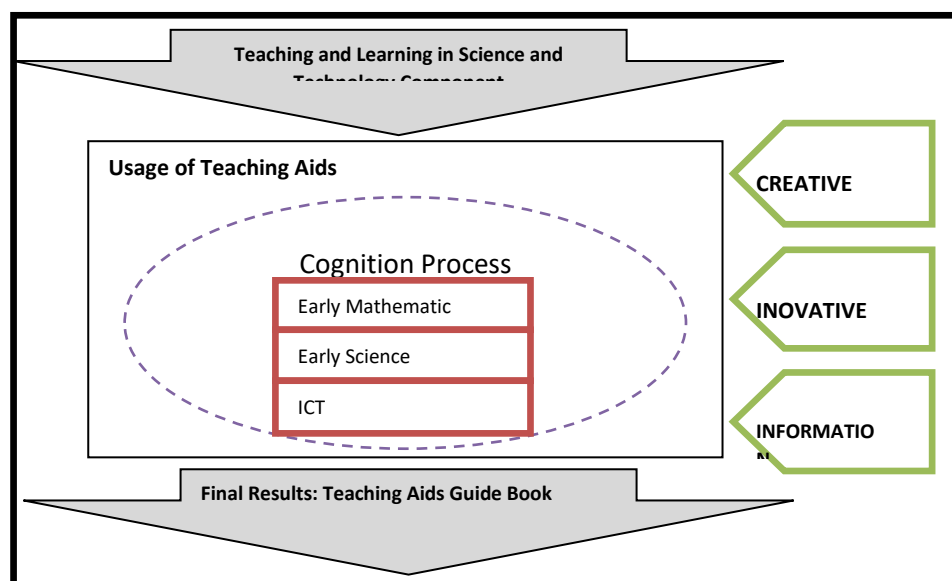


Figure 1.1: Conceptual framework of research

### Limitations of the Research

This research focuses on preschools hailing from 3 districts in Perak, which are the Larut Matang Selama, Kuala Kangsar and Kinta Utara districts. A number of 20 preschools were selected as the research location and each school involving only one preschool teacher. All the information that was derived from the research is limited to the teachers who conduct the teaching and learning process based on the Science and Technology component. The purpose of data collection is to collect data through methods involving observation and interviews.

### Literature Review

#### Preschool education

Preschool education is defined as a preparatory process before commencing to primary school level. According to Swiniarski, Breitborde and Murphy (1999), early childhood education is defined differently in different nations. On the other hand, Wortham (2000) states that early childhood education in industrial countries exist between the duration of birth up to 8 years of age, while in developing countries, early childhood education commences from birth up to 6 years of age.

The Education Ministry in Malaysia (2012) outlines in the National Education Philosophy that preschool education is an educational program prepared for children ranging from between ages 4 to 5 years and above in order to develop the overall potential of the student in mastering the basic skills needed and encourage the growth of a positive attitude as a preparation towards enrolment in primary school. Preschool education also serves to prepare children with a strong basic of socialization skills, hence instilling a strong sense of self confidence and shaping a positive self-concept. The execution of this preparation leads to the development of a model individual through teaching and learning techniques that prioritizes on a safe and interesting experience and active involvement.

**The Science and Technology component in the National Standard Preschool Curriculum**

The introduction of Science, Mathematics and Technology is not a new element in early childhood education and features as a compulsory element by the National Standard Preschool Curriculum in Malaysia. The Science and Technology concept comprises of early science, early mathematics building activities using block-based objects and the usage of ICT. The development in information technology in motivating the progress of the learning process from the traditional standpoint to a newer, computer-based process gives much importance to logic and empirical evidence before constructing scientific theories. The informational development in science stems from an inquisitive nature, innovation and creativity.

Early science provides the opportunities for students to explore their surroundings by using their senses and basic tools. In the exploratory process, a positive scientific attitude such as a sense of curiosity, accuracy and an eye for detail will be molded. During this exploratory process, basic scientific skills such as observational skills, measurement skills using standard measurement units, comparison and categorization will also be developed. Scientific explorations conducted on nature (e.g. plants and animals), natural materials (e.g. sinking and floating objects, water, and magnet) and physical properties (e.g. rainbow and climates). This component of early childhood education gives more importance to the mastery of skills compared to the gaining of knowledge.

**Early Science**

The importance of an initial experience for preschool students have been stated by experts in this field and have concluded that the introduction of an investigative and exploratory mode of learning is an experience that needs to be imbibed at an early age (Seefeldt, Galper & Jones, 2012). In accordance with Chaille and Britain (2003), children are capable intellectual explorers and 'theory builders', and tend to investigate their environments naturally. Since the early years of life, children develop their understanding of their world in which they live.

The main focus of early science is the process of teaching and learning which is student-centered, stressing on the approach of a comprehensive and integrated educational experience which is themed, play-based, contextual and project-based. Meanwhile, the main principle implemented is the suitability of the approach and content of the lesson in line with the development of preschoolers, taking into account their individual differences as well. Through this process, children will be able to obtain concepts and basic skills which will help them in continuing their learning experience to primary school (Education Ministry Malaysia, 2010). Table 1.1 displays the standard content of the Science and Technology component - early science as stated in the National Standard Preschool Curriculum.



Table 1.1:

*Standard Content for Science and Technology component – early science*

Focus	At the end of preschool education
Scientific attitude	<ul style="list-style-type: none"> <li>● Display of scientific attitude, i.e. systematic, inquisitive and responsible.</li> </ul>
Scientific skills	<ul style="list-style-type: none"> <li>● Observing objects and natural phenomena in the environment.</li> <li>● Making measurements using non-standard units.</li> <li>● Comparing and categorizing objects.</li> <li>● Making predictions based on prior experience.</li> <li>● Solving everyday problems through <i>hands-on</i>.</li> </ul>
Investigation of Nature	<ul style="list-style-type: none"> <li>● Obtaining basic information on body parts.</li> <li>● Exploring the environment with physical senses.</li> <li>● Exploring plant parts, i.e. leaf, flower, fruit and seed.</li> <li>● Exploring the characteristics, habitat, movement, and food type of common domestic animals.</li> </ul>
Investigation of the Object World	<ul style="list-style-type: none"> <li>● Exploring the characteristics of sinking and floating objects, and attraction of magnets.</li> </ul>
Investigation of the Physical World	<ul style="list-style-type: none"> <li>● Exploring common natural phenomena, i.e. clouds and shadows.</li> </ul>

### Information and Communication Technology (ICT)

According to Smith et al. (2012), a worldwide perspective demonstrates that an increase in investments has been seen in the integration of information communication and technology in early childhood education. In addition, studies have shown the advantage of implementing ICT in motivating children and providing them with opportunities to learn. Higgins, Beauchamp and Miller (2007) states that among the technological instruments that have been used are the Interactive White Board (IWB) and tablets, which have the ability to attract students' attention compared to other digital technologies such as beamers and personal computers. Smith et al. (2012) explains that ICT is capable of motivating children, attracting their attention. This enables teachers to use communication technology to enrich the learning environment of children. In addition, Goodwin (2008) claim that a number of specific researches have thrown light on the fact that IWB can bring motivation to children to learn and elevate their cognitive skills with a variety of learning opportunities, concepts and abstract ideas that are valid and reliable.

### Approaches using Teaching Aids

Teaching aids which are used in any educational process needs to be competent with the approach being used so that the teaching aids will fulfill its role in aiding teachers to obtain the learning outcomes. Therefore, the National Standard Preschool Curriculum emphasizes on an appropriate teaching and learning approach which contributes to the development of children so that teaching and learning becomes effective and brings meaning to the students. Among the approaches outlined by the Education Ministry of Malaysia (2010) are as follows:



- Student-centered learning
- Inquiry of discovery
- Play-based learning
- Integrated approach
- Theme-based approach
- Project-based learning
- Mastery learning
- Contextual learning

### **Definition of Cognitive Development**

According to Suppiah et al. (2007), cognitive development refers to the changes occurring in the process and mental skills according to the physiological maturity and experience of an individual since an early age. These changes are closely related to the interaction between genetics and the surrounding environment. Lahey (2009) stated that cognition can be defined as an intellectual process. Cognition is intertwined with the information which is received, altered, derived and used. When analyzing this definition, cognition is a process that interprets the surrounding environment to a source of information or meaning that is humanly understandable through the process cognition. The information obtained in an individual's daily life is stored in the mind. When the particular information is needed, it is then derived from the human mind and made use of.

### **Cognitive Process**

The process of cognition is an important aspect in the development of an individual. Cognition is perceived as a research on the mental processes which is used by teachers in the teaching and learning process. No ability in cognition development depends on the intrinsic and extrinsic motivation of the student. Cognitive ability has to be enriched through proper teaching techniques. According to Suppiah et al. (2009), the exploration and gaining of knowledge is highly dependent on the active mental process of the human mind. Additionally, the function of cognition such as perception, memory, language and communicative thinking, reasoning skills, decision making and aspects such as fitness and awareness are among the topics that touch on cognitive learning.

### **Research Methodology**

#### **Research Framework**

This qualitative research uses the Hermeneutic Method as a mode of interpretation by using the observation and interview texts pertaining to teaching using teaching aids in the preschool component of Science and Technology as the research sample. Based on the Hermeneutic Method, the data from observation and interviews with teachers are interpreted into metatext. In the context of this research, metatext is the interpretation of the usage of teaching aids in the teaching of the Science and Technology component in preschool.

#### **Research Design**

The Hermeneutic Approach is a methodology that makes use of text interpretations. The overall reading and analyzing of the text is done to obtain the teachers' views through text on the usage of teaching aids based on the Science and Technology component in preschool. The Hermeneutic method is used to understand the interaction of teachers with their students,

especially with regards to the teaching and learning process in the classroom (Loganathan, 1992). In the process of understanding this fact, the teachers will record the interactions in the classroom and transcribe the recording into text form. They will then conduct a research on the text using the Hermeneutic Method to obtain a better picture on the teaching and learning scenario in the classroom.

The Hermeneutic Method prioritizes on qualitative interpretation and the elaboration on meaning. Interpretation is generated through the findings from the research analysis, interview text with teachers and jottings of observations. The data was collected from the month of September to November 2015 for the 1st phase and February 2016 to April 2016 for the 2nd phase.

The interpretation of meaning is done through the process of ontopretation, in other words the understanding derived from a context from external reading to the internal structure of the researched text.

The Hermeneutic method is capable of reaching a further horizon compared to normal interpretation theories, as this method includes the interpretation of information which is external and internal in a text. Loganathan (1992) stated that the Hermeneutic method is a form of scientific research method due to the fact that it attempts to find the truth through rational of human thinking. He explains that the science of Hermeneutics is a solution to the process of understanding the behavior of mankind.

### **Research Method**

The Hermeneutic method can be interpreted as human behavior in order to achieve a deeper understanding on the process of interaction among mankind. The aspect of understanding human behavior is a challenging task for this method. It is a branch of qualitative research which is descriptive. Researchers believe that this method is suitable to study the development of teaching using teaching aids for Science and Technology in preschool.

This method prioritizes the interpretation of text in a socio-cultural and historical context by exposing the internal meaning in the research text. A meaningful prior experience on an event or incident is to be remembered directly or indirectly. Therefore, the Hermeneutic method involves the identification of meaningful information which is then used to generate themes and categorizations from a collection of texts (Suppiah, 2003).

### **Research Procedure**

Figure 1.2 illustrates on the procedure of the research in detail in order to explain the qualitative method of Hermeneutics.

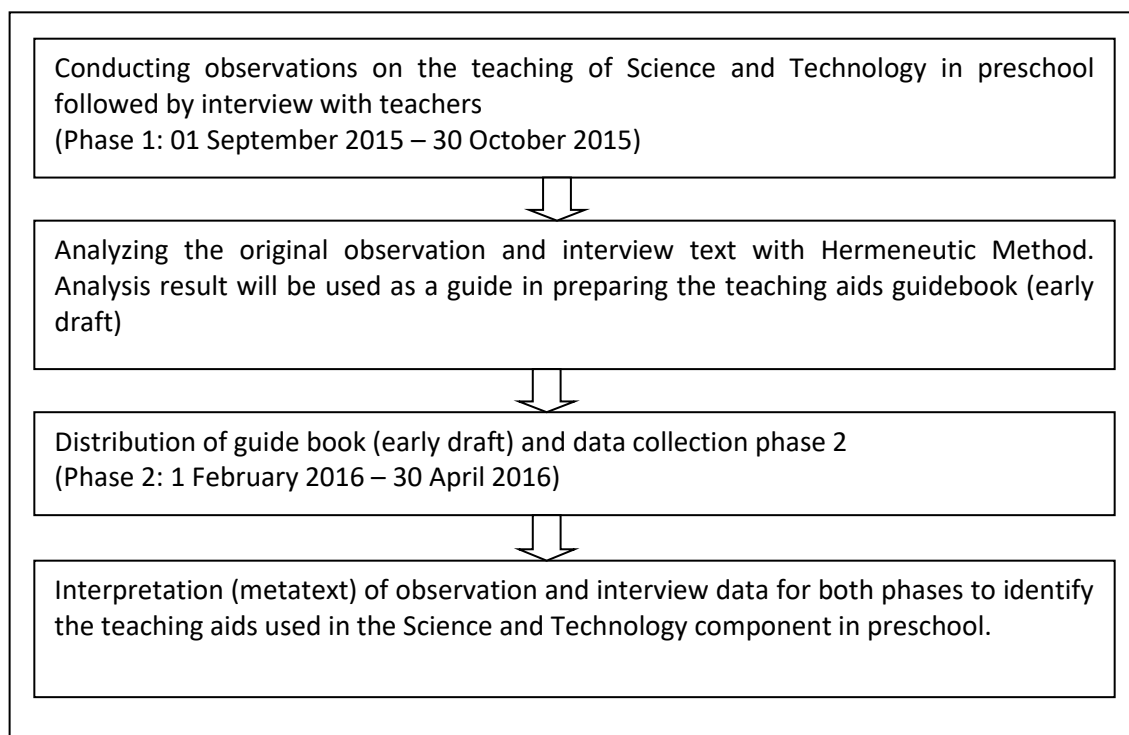


Figure 1.2: Procedure of research

In this research, the researcher carries out a study in 20 government preschools in 3 districts in Perak, specifically 7 schools in Larut Matang and Selama, 7 schools in Kuala Kangsar and 6 schools in Kinta Utara.

### Phase 1 Research

This research will be carried out from 1 September 2015 to 31 October 2015 in phase 1 with the consent and approval of relevant government authorities and the school management authorities. Data have been collected as follows:

- i) The observation data which was conducted on the teaching and learning process of preschool teachers in the Science and Technology component that focuses on the usage of teaching aids. The data was collected using the Observational Form and Teaching Aids Checklist Form.
- ii) Interviews that were carried out with the teachers used the Interview Form.

Upon collection of all the data, the researcher analyzed the research findings in order to ensure the extent to which the usage of teaching aids in the teaching and learning process in preschool, especially in the Science and Technology component. Before the commencement of phase 2 in February 2016, the researcher has prepared a guidebook (draft) whose content focuses on the enrichment of teaching aids used by teachers in phase 1. The content and language in the earlier draft of the book had obtained validation from 3 experts in Early Childhood Education. The book has been modified in terms of language and content according to the amendments recommended by the experts. This book was given to the teachers to imbibe the contents on teaching aids as a guideline for preschool teachers. This book was planned to be distributed in January 2016.

### **Phase 2 Research**

The second visit will be carried out in February 2016 up to 30 April 2016 to every school mentioned earlier in phase 1 and in phase 2 in order to carry out all the processes or activities with the preschool teachers in order to analyze the development and execution of the guidebook (draft) on the usage of teaching aids in preschool.

### **Research Findings**

#### **Suitable teaching aids in the Science and Technology component in preschool**

In identifying the teaching aids used for the Science and Technology component in preschool for the cognitive development of students, the researcher used the observational method during the teaching and learning session as well as interviews with preschool teachers after the teaching period. The observational processes that were carried out focused on the type of teaching aids and methods of use. The following research findings involve the observations on the teachers' teaching methods focusing on the usage of teaching aids in Phase 1 and 2 of the research.

The findings of the research show that during the teaching of Science and Technology, preschool teachers made use of variety of teaching aids. In phase 1, almost all the teachers made use of more than one type of teaching aid in their teaching process. Despite that, in phase 1 there were also teachers who did not use specific teaching aids in their teaching sessions, instead depending on materials in the surrounding environment and worksheets. In the meantime, in phase 2, all the preschool teachers made use of more than 2 teaching aids in their teaching sessions, including teachers who used up to 6 types of teaching aids (based on the specified activity) in specified teaching slots.

Figure 1.3 displays the types of teaching aids used as well as the number of teaching aids used in phase 1 and 2 of the research.

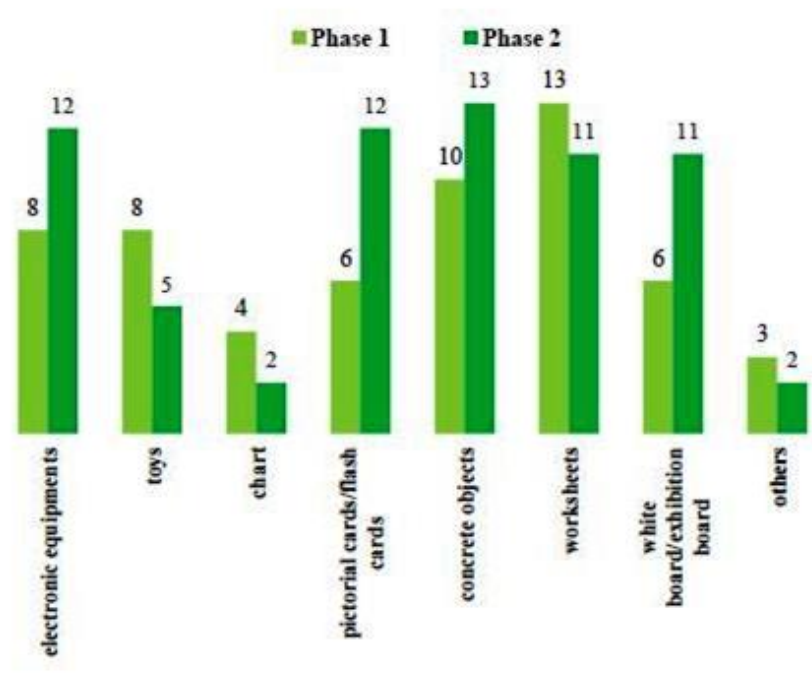


Figure 1.3: Type of teaching aids and frequency of usage in Phase 1 and Phase 2

Figure 1.3 clearly illustrates the variety of the types of teaching aids which is used in the Science and Technology component, which is electronic equipments, toys, charts, pictorial cards or flash cards, concrete objects, worksheets, white board or exhibition board and other types of teaching aids. Teaching aids from the electronic equipment category include computers, television, Compact Discs and LCD projectors. Alternately, teaching aids involving toys include puzzles, dolls, balls, fruit models and animal models. Meanwhile, teaching aids involving charts include magnetic charts, food charts, charts on hazardous home appliances and so on. Pictorial cards include cards with pictures and flash cards are cards including all other cards other than pictorial ones.

Concrete objects refer to real-life, authentic objects, such as fruits, flowers, leaves, water, earth, food products and other materials used in experiments like magnets, rulers, chairs and floating objects, non-dissolving objects and so on. Other than that, worksheets involve teaching aids used as further practice such as observational tables, questions, work books and creative artwork. Other teaching aids refer to songs, dramas and field trips.

Research findings for both phases show the total increment on the usage of teaching aids of the electronics equipment type, flash cards or pictorial cards, concrete objects and white boards or display boards. Teaching aids of the type pertaining to toys, charts, worksheets and others show a decrease in usage. The increase of teaching aids as stated above can be seen in the significant increase of 6 usages. The decrease in the usage of teaching aids as stated above is not more than 3 usages.

**How is the guidebook on the usage of teaching aids in the teaching of Science and Technology prepared?**

With regards to the preparation of the guidebook on the usage of teaching aids, the researcher proceeds with an analysis with relates to the need for these teaching aids. In terms of the content of the guidebook as well as the way in which the guidebook was constructed (based on results from observations and interviews that were conducted. The significance of grounding the content of the guidebook based on results from observations and interviews lie in the fact that the production of this book needs to be relevant and parallel to the needs of pre-school teachers as a reading and reference material in order to increase their knowledge in the usage of teaching aids, specifically for the teaching of Science and Technology.

The focus of this guidebook on the usage of teaching aids reveals characteristics that are inclined towards creativity, innovation and information in order to enable the cognitive development of preschoolers. The additional aspects of scientific and mathematical processing skills are also emphasized in this guidebook. Therefore, the observations carried out focuses on the types of teaching aids used by preschool teachers in the teaching of Science and Technology, as well as its method of use.

**Is the usage of the teaching aids guidebook on Science and Technology effective in enhancing students' cognitive development?**

In order to identify the effectiveness of the usage of the teaching aids guidebook on Science and Technology, which was constructed for the benefit of developing the cognition of preschoolers, the researcher focuses on a few aspects. This includes suggestions on the usage of the guidebook, suggestions on the teaching aids used in the guidebook, the content of the guidebook, the appropriateness of the guidebook in teaching Science and Technology, and the effects of using the guidebook on cognitive development.

The effectiveness of the teaching aids guidebook can be seen from its suitability in using it at preschool level, especially in the area of Science and Technology. This is imperative in ensuring whether the guidebook can be made use of by preschool teachers. Preschool education emphasizes on the usage of concrete objects, and activities that are in line with the cognitive level of the preschoolers and the National Preschool Curriculum Standard.

**Conclusion****Implications of Research**

Teaching aids are any form of thing, object or tool, concrete or abstract that can be used and manipulated in order to achieve the objective of the teaching process. Preschool education needs the usage of teaching aids that can help in the teaching and learning process as children possess limited knowledge to understand a concept if teaching only depended on the explanations of the teacher alone. The teaching process is closely related to the responsibility of the teacher as the deliverer of knowledge and the effectiveness of the teaching process depends on how far teachers succeed in achieving the teaching objectives in helping children teach what needs to be taught. The teaching and learning process will become more effective if teachers succeed in using creativity and the integration of teaching aids.

This research was conducted to identify the types of teaching aids used by preschool teachers in the teaching of Science and Technology in preschool towards the enhancement of cognitive development in students. A few implications can be highlighted encompassing the implications to the teachers and educational authorities.

This research has explained that the multitude of teaching aids used by preschool teachers in the teaching sessions did not achieve the level of optimum usage, directly influencing the development of the students' cognitive skills. Based on the discussions from the findings, it is revealed that there is a lack of teacher knowledge regarding content of the lesson, skills in technology operation and finding out new and original ideas as well as lack of exposure towards the usage and creation of teaching aids in a creative, innovative and informative manner. This finding reveals that teachers lack the initiative in amending the weakness of the teaching and learning sessions acknowledged by the teacher. For the science component, the teaching of teachers does not stress on the skills needed in scientific processes such as reasoning skills and inquiry skills.

### **Research Contributions**

This research is a form of informational channel not only for preschool teachers, but also to researchers as well as relevant sectors. This research contributes in terms of information and knowledge which can be used by relevant people in preschool education at the ministerial level, preschool teachers, the government and private sectors to researchers who are interested in conducting research pertaining to the usage of teaching aids, specifically in the teaching of Science and Technology.

This research contributes in the form of information to all the relevant authorities and educational institutions on types of teaching aids, methods of use and a suitable approach in the teaching and learning of the Science and Technology component in preschool education. Elements of creative, innovative and informative needs to be inculcated both in the creation and usage of teaching aids in the effort to develop students' cognitive capacity holistically.

This research also plays an important role in contributing to preschool teachers, whether private or government, on the importance and needs of teaching aids in giving information and understanding the concepts in science or mathematics to children. The usage of teaching aids at an optimum level gives a direct and positive effect to the learning of students as well as the teaching of the teacher itself.

The next contribution involves the future researchers who wish to conduct researches relevant to the aspect of using or creating teaching aids. The findings of this result may be able to give rise to research questions as a core issue for further research using the Hermeneutic method as a method of analyzing research data. The research also contributes to literature review for further research pertaining to the teaching of Science and Technology in Malaysian preschools and teaching aids with creative, innovative and informative criteria for the teaching at preschool level.

### **Recommendations for Further Research**

The findings from this research has come up with information for researchers about the teaching aids for the teaching of Science and Technology in preschool as well as methods of



using the teaching aids with creative, innovative and informative elements. Based on the research findings, new questions can be used as the basis for further research. Further research touching on the usage of teaching aids at preschool level can contribute to the teachers and preschool education itself. Below are recommendations for further research that is capable of contributing to preschool education:

- i. Further research is recommended to perceive the usage of teaching aids to teach other components present in the National Standard Preschool Curriculum other than Science and Technology.
- ii. Further research can also be done in private preschools to explore the types of teaching aids and its methods of use that can increase the development of children's cognition holistically.
- iii. Further research can also be done at tertiary levels offering early childhood education courses to identify teaching aids to be used in preschools from the students' perspective.

Based on the recommendations stated above, the researcher hopes that this research will give rise to further research that will be beneficial to preschool education in the usage of teaching aids at preschool level for the purpose of increasing the quality of preschool education.

### **Conclusion**

Preschool education plays an important role in the development of early childhood as, through preschool education, children are exposed to a wider educational environment compared to learning at home. This exposure more or less enables students' development and readiness in going through an authentic educational experience. A relevant learning experience related to the children's lives will not only generate meaningful learning, but hinders forgetfulness.

Therefore, in preparing for meaningful learning to take place, preschool teachers need to perform their responsibility by planning the teaching session effectively by using the approaches, activities and teaching aids that are appropriate. In the context of teaching Science and Technology, the usage of teaching aids in the prioritizing the teaching experience and provide an understanding to preschool students, especially regarding concepts and terms found in science education. The selection of teaching aids also matures to the preschool education which is suited to the requirements of the 21st century.

The appropriateness of teaching aids with the activity that is planned will help the teacher in channeling information smoothly and effectively by achieving the learning objectives more effectively. The impact to the usage of teaching aids can enable the teaching experience to become an authentic experience and mould children to become learners who understand their surroundings and capable of applying what has been learnt in their daily lives.

Consequently, this crucial integration will help children build a strong sense of confidence on the importance of knowledge in life and work hard to gain knowledge through the learning process in preschool. In line with this insight, it is important for teachers to master the usage of teaching aids for the purposes of making the teaching and learning processes to become more interesting, positive and suitable to the learning content.

### Acknowledgement

We would like to extend our gratitude to National Child Development and Research Centre (NCDRC) Sultan Idris Education University and Ministry of Higher Education (MOHE) for approving the research grant for the study.

### Corresponding Author

Suppiah Nachiappan, Department of Educational Studies, Faculty of Human Development, Universiti Pendidikan Sultan Idris, Tanjung Malim, Malaysia, Email: [suppiah@fpm.upsi.edu.my](mailto:suppiah@fpm.upsi.edu.my)

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