INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 7, Issue 11, (2017) E-ISSN: 2222-6990

The Implications of using Teaching Aids in the Teaching of the Science and Technology Component in Malaysian Preschools

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DOI Link: http://dx.doi.org/10.6007/IJARBSS/v7-i11/3485

Published Date: 10 November 2017

Abstract

In accordance with the Ministry of Education in Malaysia (2010), a crucial change involving the content and learning levels of preschool curriculum has been emphasized. Specifically, an early focus on the education of Science and Technology as a component in preschool curriculum has been proposed, involving skills such as exploration, investigation, observation, classification and so on. The importance of these skills are mentioned by Gallenstine (2004) who states that practical activities are necessary for children to empower their observational skills. Bose, Tsamaase & Seetso (2013) reiterate this finding by stating that the use of teaching aids help in the stimulation and motivation to problem solving and decision making skills. This study aims to identify the types of teaching aids used by the preschool teachers and the problems faced related to it in teaching the Science and Technology component. Qualitative method used and data were analyzed using Hermeneutic method and the findings show that preschool teachers use 2 types of teaching aids which is electronic and non-electronic. The

problems faced by teachers are related to the two aspects which are, in creating and using the teaching materials.

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

1. Introduction

Transformation towards the preschool curriculum on 2010 (Sharifah Nor and Aliza, 2011) stresses on the standard of the content and learning based on the knowledge applied, the basic skills and the values instilled onto the six learning sections (Ministry of Education of Malaysia, 2010). Learning focus on Science and Technology component points into the inquiry method, scientific knowledge and scientific characteristics for the early education of science. On the contrary, early education for mathematics and ICT scopes into knowledge and mathematical mastering, problem solving skills and the ICT usage. Early education in science involves finesse science process such as to explore, investigate, observe, classify, experiment, compare and contrast, and make predictions. Meanwhile, early mathematical teaching focuses on pre-number experience, numbering concepts, operational numbering, money value and time concept (KPM, 2010). This is clearly shown with the need towards the teaching aids (TA) in Science and Technology component. Dinc (2011) states that in the preschool learning, experience and the ability of teacher is important in choosing TA, preparing and using the TA for the sake of the importance and knowledge of the students. Due to that, it is very much vital for the preschool teachers to master and know the knowledge through teaching practical set aside the courses and then increase the level in mastering it in their professionalism (Dinc, 2011).

By using TA, students get to involve themselves with the science processes skill. With that, inquiry process takes place. This is where the students get stimulus and motivation to shape the concept and build thinking skills by solving problems and making fast decisions without just memorizing the scientific and mathematical concepts (Bose, Tsamaase&Seetso, 2013). Ilias and Jasmi (2012) states that by using TA, teacher only involves 25% in it during the teaching and learning (T&L) session while acting as a facilitator. The effect on it makes the T&L go through changes from being teacher-based to student-based. Relating to that issue, teacher has to master the skills on the usage of TA to make it a very creative T&L lesson with positivity and much related to the content of the learning.

2. Literature Review

The teaching method of mathematics and science concept needs to shape up an important part of the daily activities in preschool, and it has to be a part of the basic curriculum. Activities that involve identifying and problem solving has to be chosen as activities have importance in many domains. These activities help kids focus on their observation skills while giving them experience on classifications through number identification, length, width, weight, colour, function, shape, geometrical values, patterns and textures with specific choices (Bose et al., 2013).

Gallenstein (2004) states that kids need hands on activities to believe and see what takes place because science is not intuitive. These daily activities are rich with early concepts to science and mathematics. According to Bose et al. (2013), educators play a part to use the T&L process as a way to look into activity choices that relate to the students' surroundings,

whether it is inside nor outside the class so that they encourage all domains of learning. Meanwhile, Bers&Portsmore (2005) agreed that they need to use multimedia based technology to instill the interest in them, without depending on the traditional items fully. The importance of TA in the early childhood education has been stressed on by many researchers on their research. Teacher must prepare many types of teaching aids (Moyer, 2001), suitable to environment and time to support the growth and the level of academics (Wortham, 2002) and give kids the chance to choose their own activities and materials provided (Kostelnik, Soderman&Whiren, 2004). Activities in preschool also has a meaning to it while helping kids to increase knowledge level and the mathematical and science concepts through many types of stimuli. According to Jacobi-Vessel, Todd Brown, Molfese& Do (2016), effective teaching depends on the pedagogy which includes the teaching materials, methods and teaching objective to be carried out by teacher in educating students. Dinc (2011) states that the experience and skills of a teacher is important in choosing, preparing and using precise TA related to the interest and need of the kids.

Chen and McNamee (2011) proves that positive methods are the main contributors to the increase in level of kids understanding, but the level of execution is not the same for all activities. Dinc (2011) and Bose et al., (2013) show that everyday TA in preschool is not sufficient and is limited, TA which does not meet the expectation of teaching specifically in early education of mathematics and science. Preschool teachers have to start realizing that the preparation of teaching starts with the understanding of the pedagogy content which directly affects teachers teaching in class.

3. Research Objectives

i. Identify TA used by teacher in the teaching process of the science and technology component.
ii. Identify problems faced by teachers with the TA specifically on the teaching of science and technology component on preschool.
assessment in this study the evaluation

4. Research Methodology

This research uses the Hermeneutic method as a way to obtain the research findings. This method is said to be a method of interpretation, observation text transcription and the analysis of the DLP document regarding the teaching with the use of TA in the science and technology component in preschool as samples of the research. 7 preschool teachers from LarutMatang and Selama district in Perak state is involved in this research. According to the Hermeneutic method, a teacher's DLP and observation text transcription is known as metatexts after interpretation. Metatexts in this research is the interpretation of the usage of TA in the science and technology component in preschool learning.

The term ontoenigma on the text is rather defined as blurry or not accurate and normally brings up many questions to researchers who want to dive into the text. Ontoenigma is a situation of when the mind of the researcher faces the text that has been researched (Loganathan, 1992). A text is read through outer structure. The researcher then dives into the definitions of the words read to bring out the meaning that lies inside on the internal structure. The process on connecting the external and internal structure is known as ontopretation (Loganathan, 1992).

Suppiah (2013) states that when a researcher starts interpretating text, he/she will go through ontoenigma about the textual content. Many questions may rise to the eye of the researcher to fathom the text which are the DLP and interviews with the teachers. When looking into the texts, ontopretation process takes place and an understanding is obtained when related to the previous texts. When looking through its details on the aspects from the previous episode of texts, ontopretation takes place many times until the researcher is able to comprehend and interpret the text very clearly. Loganathan (1996) explains that the hidden meaning can be traced and understood and it is defined as lumens. This incident with ontoenigma on the text will disappear and then reach the level of understanding and clear knowledge of the texts.

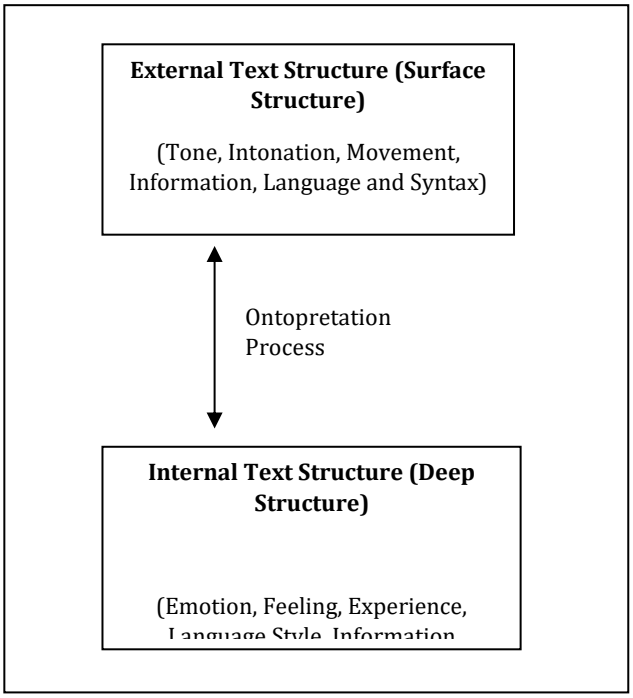

Figure 1: Ontopretation Process (Suppiah, 2003)

5. Findings

The method of observation, the interview and analysis of the structure of the DLP document the teachers in getting the findings. Based on observations of five science teachers teach initial components while two teachers to focus on teaching early math component. Table 1.1 below is the findings based on observations carried out.

Table 1:
Type of teaching materials used by teachers in the teaching of science and technology component

Teaching Focus	**Usage of TA**	**Electronic Types**	**Non-Electronic Types**
Preschool A : Investigate the nature of materials: Students can classify whether objects are attracted to a magnet or not.	**Magnet shapes (model):** Teachers uses a variety of magnet model form as introduced that the magnet consists of different forms. Magnets are also used in groups to conduct investigations and observations of objects either or not when the magnet is placed in close proximity to the object. **Magnetic and non-magnetic materials:** Materials used in the experiments were carried out to see whether the ingredients attract / repel when the magnet is brought near. Examples of materials used are stainless steel spoon, scissors, nail and paper. **Table observations:** Students are given an observation schedule and are directed to sketch images of objects that are attracted and not attracted to a magnet in the space provided.		√ √ √
Preschool B: The concept of numbers: Understanding additional operations in the range of 10. Sum of two sets of objects	**Card Number:** Number 1 to number 10. **Toys:** Teachers use toys (cars and animals) to perform the adding operation. **Worksheet:** Teacher distributes worksheet of adding operations to the disciples as a reinforcement to the learning of the class.		√ √ √
Preschool C: Investigate the nature of life: Students can observe and narrate the life cycle of commonly found animals.	**Songs butterfly:** Teachers choose this song as set induction in introducing the topic of the day. The selection of songs is in line with the teaching of the title, because the song itself tells about the life cycle of the butterfly.	√	√

	Computer and LCD: TA used by the teacher to show the life cycle of butterflies as an introduction to the topic of teaching. **Charts of life cycle of the butterfly:** Teacher explains the life cycle of butterflies using charts of the life cycle of the butterfly. **Model Butterfly:** In closing for the day's learning, teachers teach students to make butterfly origami.		√ √
Preschool D: Investigate the nature of life: Students can observe and narrate the life cycle of commonly found animals.	**Flash Card:** Teacher tells about the life cycle of a frog. **Whiteboard:** Teachers also use the whiteboard to explain about the life cycle of the frog by drawing pictures. **Photo cards and manila card:** TA used to run group activities. They are divided into 6 groups and each group was given a manila card and some pictures. Students are asked to paste the pictured cards on the table according to the life cycle of a frog as what has been taught.		√ √ √
Preschool E: Investigate the nature of object to observe and collect objects that submerge and immerge. Make predictions of what will happen based on past experience (rise and fall)	**A jar of water and heavy/light objects:** By using this, science teacher performs skills, i.e. observations and experiments with students to demonstrate whether the object sinks or floats. Teachers include objects for individual students by making observations to see whether the object sinks or floats. Among the objects used are brick, scissors, straws, coins, pencils, apple, paper clips and ball. Then the teacher asks the class whether the object is floating or sinking.		√
Preschool F: Number operations-Students can remove objects from the collection and counting tray correctly	**Chicken stuffed toys with songs 'Chicks':** By using the stuffed toy, teacher sings "Chicks" together with pupils. Teacher uses song as an introduction to the concept of early rejection operation. Through lyrics Chicks concept starting		√

	operation can be introduced to the students. **Computers:** Teaching developed by the broadcast of video stories "Ducklings" using the computer, which tells the journey of 5 ducklings climbing the hill. Mother duck calls ducklings, one by one they fall, and disappear. Finally, all the ducklings are lost. This video shows the operation of rejection, of the amount of 5 ducklings that becomes a value of 0. **Numerator:** Teachers use this for the student to count from 1 to 5. The teacher then uses the card number as well as paper plates and ask them to count from 1 to 5 using the object. **Worksheet:** The teacher gives the students the paper with a picture, and give direction to crop the image according to the amount mentioned by the teacher. For example, the image of the house, there are 4 pictures, the teacher asks them to cut two pictures of the house, the result stays as 2 picture of house on the paper. **Games Decline:** The teacher to carry out activities to play with the ball. The teacher asks the students to take questions from the box. Based on the questions, students need to put the ball in the basket according to the questions given, and calculates the remainder. For example, there are 5 balls, students must put 3 balls into the basket, and the remaining balance is 2 balls.	√	√ √ √
Preschool G: Investigate Natural Life: Observe and record the process of seed germination and	**Computers:** Teacher uses the computer as video display during the set induction and development. In the video "gardening" as information to students how planting trees.	√	√

seedling growth in terms of height and the leaves with guidance.	**Chilli plants:** Teacher shows chilli plants are grown in pots (of concrete) while explaining the process of plant growth. Teachers will also add information to show students chilli seeds. See innovative teaching when the teacher in front of students splitting chilies to show to students. At the end of the lesson, the teacher conducts activities to measure the height of chilli trees with students. **Equipment and tree planting seeds:** Teacher demonstrates how to plant chilli in front of students. Then the students plant chilli in a group. **Whiteboard:** Whiteboard is used to describe what has been taught from the beginning of the lesson. Teacher draws pictures of plants to explain the process of chilli tree growth. **Worksheet:** Worksheet is provided in respect of chilli growers. Students need to compare images in order of how chilli plants grow.		√ √ √

Types of TA used by teachers on the teaching of science and technology component.
Based on the findings of the research as mentioned in the above table, researcher categorized the different types of TA used by the teachers to two aspects, electronic and non-electronic. The findings show that 3 teachers used TA from electronic types which are teachers C, F and G.

Teacher C used computer to show video clips on the life cycle of a butterfly. Through this video, students have a clear picture on the life of a butterfly while getting new information. The usage of this video is precisely on the topics taught, mainly to explain the definition of new words such as cocoon and so on.

Teacher F used a video on the song “Baby Duckling” whereby the content of this video holds a concept on the basic operation of rejection. This choice of video achieved the learning outcome of the topic taught on that very day. Students started to have fun and focused on their learning process. Whereby Teacher G used a video on gardening where it provided them with information on how to do gardening. Teacher uses the video as a set induction, the introduction to the topic that was to be taught.

TA of the non-electronic types on the other hand consists of raw material, concrete objects and songs. Based on the observations, every preschool teacher use more than 2 TA. This clearly shows that preschool teachers have high exposure on the importance of the usage of TA for science and technology component.

Raw material used by teacher is the chilli plant. Teacher G used the chilli plant to show the growth of the seedling. The usage of the chilli plant is looked on as an innovation in teaching because students can observe it for themselves on what has been planted. The teacher also cut the chilli right in front of the students to show the seedlings inside it. This method is very much interesting and involves science process related activities such as identifying, investigating and making observations.

Whereby concrete objects consist of games, magnet models, magnetic and non-magnetic items, gardening tools and so on. Teacher also uses songs as the TA, the lyrics have connection to the topic that will be taught by the teacher. This shows that the teacher makes the choice of song not only as a medium to attract students but also as a medium of information to teaching. In a whole, usage of TA is suitable and accurate to the teaching of Science and Technology.

Table 2:
Usage and the aspect of the production of TA

Data from respondents through interview	**Preschool**						
	A	**B**	**C**	**D**	**E**	**F**	**G**
• **Course on preparation of TA**							
- Specific courses	√		√				
- Other courses (general)		√					√
- Never attend courses on the preparation of TA				√	√	√	
• **Specific manual on preparation of TA**							
- KSPK (NSPC) book				√	√	√	
- Others	√			√	√	√	√
- No manual used		√	√				
• **Problems using TA**							
- Preparation of TA during P&P takes up a lot of time	√		√		√		
- Technical problems	√	√				√	√
- Insufficient TA or difficult to be obtained		√	√	√			√
- Other manuals (books/CD/and others)						√	
- Internet service			√				
- No problem							√
• **Problem with TA preparation**							
- High production cost					√		

- Lack of time in preparing TA	√	√	√				
- Insufficient funding from school			√	√			
- Not efficient in preparing TA						√	√
• **Aid from school administration on preparation of TA**							
- School provides TA for teachers	√			√	√	√	√
- School provides teachers with electronic devices such as computers, LCD projectors and so on.							
- School provides infrastructural equipment	√			√			
- No/less help from school authority		√	√				

Problems faced by teachers related to TA specifically for the teaching of science and technology of the preschool

Researcher carried out an interview with a teacher after the teaching and learning session to know what is the issue faced by teachers in handling TA related problems specifically on Science and Technology. Based on the research finding on Table 1.2 as shown above, researcher concludes that issues faced by teachers can be divided into two which is the aspect of usage and the aspect of the production of TA.

The main issue faced by teachers on the aspects of usage of TA is that TA is provided in school is not sufficient and is difficult to be obtained. Other than that, teachers also face technical problems like the CD provided is not working and not of high-quality. Teachers need more time to prepare TA to be used for teaching. The storage of TA after teaching hours also adds up a lot of time consumption.

In this aspect, there are teachers who feel that the absence of internet service makes their TA usage related to ICT difficult. Teacher F feels that the problem on the usage of TA is due to the fact that they do not have any instructions or manuals on it. Teacher G on the other hand says that it was not face by him/her when using TA.

The research shows that only two teachers have attended special courses on the preparation of TA. This could be a factor on the cause of problems in the usage of TA. Other than that, teachers have no specific manuals or instructions on the usage of TA, leaving them to solely depend on National Standard Preschool Curriculum (NSPC) and other resources according to the teacher's initiative.

On the aspect of the production of TA, teachers face issues with timing when preparing their own TA in accordance to their commitment and the burden. Teachers also say that the funding by the preschool is insufficient. Teacher F and G said that they are not good in preparing TA while teacher E feels that the preparation of own TA takes up a lot of money. However, nearly all teachers agree to the face that the school authority helps them in preparing the TA requested by the school. This includes the infrastructural facility such as computer labs. Only teacher B and C have stated that the school does not help much in the preparation of TA.

6. Discussion

In a whole, the researcher is able to conclude that based on the research, there are two main categories of TA that can be used by the preschool teacher, that is electronic and non-electronic. Electronic types are those on computers and LCD projectors whereby non-electronic aids are the raw and authentic object models, concrete materials, pictured charts, games and songs.

Observation that is carried our shows that teachers work hard and creatively in bringing success to the teaching plans while achieving the learning outcomes and objectives. Every teacher uses a few combinations on a few TA and activities planned that stimulates students to use such skills to what that has been taught on. Every activity has its own flow on the starting of the teaching to its very last minute of the lesson plan. Usage of TA also gives positive impacts towards the learning of the students where they stand a chance to enjoy and actively participate throughout the lesson.

This clearly shows that teacher understands the content of teaching and focusing on making decisions to TA as well as the activities carried out. This research is much related to that of Chen and McNamee (2011) that proves the positive method is the contributor to the rise in level of the children. Research also shows that preschool teachers fulfill the requirements as to certain aspects pertaining to the selection of activities, methods and TA. Erden and Sonmez (2011) says that teachers play a part in preparing the perfect learning environment where students have many chances to watch, search and face the object's nature; it helps them to realize the intellectual power they own; watching them, hearing their conversations and answering their questions when they are blended into scientific learning and so on.

Whereby in problems faced by teachers regarding teaching aids (TA), the findings in the interview with preschool teachers show that there are two main problems that is i) aspect on usage and ii) aspect of execution. On the usage, problems identified is i) TA is insufficient and difficult to be obtained, ii) technical issues such as interactive CDs are not working and ICT equipments are not the ones with high quality, iii) TA preparation needs long time, iv) absence of internet service does not help in the preparation of TA that involves ICT and v) no instructions on the usage of TA.

Problems regarding the lack of teaching aids is not something new. It is very much synonym to the problems faced by many institutions including preschools. This problem is very closely related to the source of money itself that involves the authority as well. This is very worrying as it may drain out the participation of students in learning as it does not give them any impact to learning while causing them to be uninvolved. Dinc (2011) and Bose et al., (2013) say that the lack of teaching aids in school can affect their learning process especially in the knowledge of science. To avoid such issues, the source of money should be increased or teacher can also create their own teaching aids by recycling the old ones.

Technical problems such as to those are well related to the administration management in getting stocks of interactive CDs and electronic gadgets. This frictions with the expenditure of the preschool to get high-quality equipments that take up a lot of money. Teachers have also voiced out on problems with the lack of internet service where this plays a part in cutting

down their creativity and the integration of ICT in their teaching plans. Internet service is surely to ease their burden while helping them look for fresh ideas to make teaching more effective.

Teacher also faces many problems regarding time needed for the preparation of teaching aids. This is because the teacher has to prepare aids that can be used by every student in ensuring everyone's participation. This is very much related to the size of the class handled by the teacher himself/herself. Norashid and Hamzah's research (2014) show that a class with a large number leaves an impact to the teacher especially in management and it adds up to their already heavy burden. In such cases, planning and early preparation of teachers and preschool authority may ease the preparation of teaching aids.

Whereby problems from the aspect of production, preschool teachers face with, i) insufficient time in producing TA, ii) funding prepared by the preschool is insufficient, iii) no skills, iv) high cost consumption, and v) the authority does not help much in the preparation of TA that is needed by the teachers. Problems from this aspect can be avoided by ensuring that the wide knowledge and skills of the teacher is on par with the current growth of education. This is because the experience and skills of the teacher is vital in the selection, preparation and usage of suitable teaching aids and interest of students (Dinc, 2011). To obtain such skills, teacher has to prepare exercises to strengthen their professional skills in the teaching line. Through this, they involuntarily are able to execute plans on time and management issues effectively and efficiently while ensuring the quality of their teaching aids.

7. Conclusion

The results of this research shows that preschool teachers have played their part as a source of inspiration to the students while bringing changes in them. It can be clearly seen that teachers have worked hard to make education meaningful, interesting, suitable to the interest and need of the students.

Teachers move together on par with the development of technology whereby they are able to integrate ICT into their teaching methods. This stresses that they are aware that students are growing fast in the world of technology that is developing rapidly. Lessons are also planned and carried out well even though they face severe problems whereby their teaching materials are insufficient and when time does not permit in preparing and developing teaching aids. This shows that they hold themselves up as responsible teachers who carry out their duties well in bringing students up to where they belong. With that, this research is hoped to be an inspiration to preschool teachers so that they work diligently to make the teaching and learning process in classes as a platform to strengthen their teaching profession.

Acknowledgement

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

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