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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v8-i1/3841 DOI:10.6007/IJARBSS/v8-i1/3841

Received: *20 Dec 2017,* ***Revised:*** *13 Jan 2018,* ***Accepted:*** *15 Jan 2018*

Published Online: 05 Feb 2018

In-Text Citation: (Ahmad, Baharom, Yahaya, Sani, & Alimon, 2018)

To Cite this Article: Ahmad, C. N. C., Baharom, S., Yahaya, A., Sani, S. S., & Alimon, H. (2018). The Development of "Jom Teroka dan Selidik Sains" Teaching Module. *International Journal of Academic Research in Business and Social Sciences*, *8*(1), 703–712.

Vol. 8, No.1, January 2018, Pg. 703 – 712

http://hrmars.com/index.php/pages/detail/IJARBSS | JOURNAL HOMEPAGE

INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES
HRMARS MANAGEMENT ACADEMIC RESEARCH SOCIETY EXPLORING INTELLECTUAL CAPITAL
www.hrmars.com
ISSN: 2222-6990

The Development of 'Jom Teroka dan Selidik Sains' Teaching Module

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Abstract
This study aims to design and develop 'Jom Teroka dan Selidik Sains' teaching module. The teaching module was developed based on science for early children that focused on sensory development and understanding of the environment. The data was collected through interviews, observations and document analyses to identify appropriate activities for 4 years old children. The module covered four learning areas that consists of 10 suggesting activities that could engage children to doing science through exploration and investigation. The teaching module has good validity (expert agreement was more than 80%) and good reliability (Alpha value more than 0.7).
Keywords: Module, Early children, Science Activities

Introduction

The young child's mind is inquisitive and full of questions. The never ending seemingly 'trivial questions' young children ask may, in fact, be a complex science investigation. How can teachers take advantage of this situation? According to Trawick-Smith (1994) teachers can stimulate curiosity by asking questions themselves, and by responding with warmth and enthusiasm to children's inquiries. Working with young children offers the opportunity to facilitate powerful learning experiences and inspire deeper investigation that will validate and empower children to learn science. Young children are naturally equipped to learn through observation and investigation. Every experience, every word, every toy deeply impacts the child's understanding of her world and the connections she makes. Every time a child learns something new, the brain rewires itself based on the child's understanding. Every time the child repeats a task or a skill that particular neural pathway is reinforced and strengthened. 'Learning changes the brain because it can rewire itself with each new stimulation, experience, and behavior' (Jensen, 1998, p. 13). The more a neural pathway in a child's brain is used, the stronger it becomes; conversely, if it is not used, the pathway can be lost.

In early childhood, it is important that science activities be hands-on, child-driven, authentic, and active. According to Kamii and Lee-Katz (1982), children acquire scientific knowledge by 'construction' not by instruction. They must create or construct an explanation of observed phenomenon or the outcomes of experiments internally- an explanation that holds personal meaning (Trawick-Smith,1994, p. 203). Allowing and encouraging young children to explore the scientific process, rather than only using direct instruction, will promote the development of thinking skills such as organizing and classifying, problem solving, reasoning and logic thinking skills.

Research Problem

Many early childhood education teachers frequently report feeling less prepared to teach science than other subjects (Wenner, 1993). Part of teachers' unpreparedness to teach science is attributed to many misconceptions that science is difficult to teach. These misconceptions have lead teachers to lack of confidence, and be reluctant to teach science (Seefeldt & Galper, 2002). Many teachers think that children's science requires memorizing lots of complicated scientific concepts and facts. This maybe true for a more traditional science classroom where students 'learn' science, but the emphasis of science today has changed to students 'doing' science. Doing science in the 21st Century encompasses learning to question, observe, classify, communicate, measure, predict, infer, experiment, and construct models. Current research also indicates that young children have the capacity for constructing conceptual learning and the ability to use the practices of reasoning and inquiry (NCR 2007, 2012). Many adults, including educators, tend to underestimate children's capacity to learn science core ideas and practices in the early years and fail to provide the opportunities and experiences for them to foster scientific skills and build conceptual understanding (NCR 2007, p. vii). Also underestimated is the length of time that young children are able to focus on science explorations. Effective science investigations can deeply engage young children for extended periods of time, beyond a single activity or session.

Everyday life is rich with science experiences, but these experiences can best contribute to science learning when an adult prepares the environment for science exploration, focuses children's observations, provide time to talk about what was done and seen (NAEYC 2013, p. 18). Young children also develop science understanding best when given multiple opportunities to engage in science exploration and experiences through inquiry (Bosse, Jacobs, and Anderson 2009; Gelman, Brenneman, Macdonald, and Roman, 2010). The multitude of scientific phenomena in the surroundings of young children has not been exploited as an avenue for teachers to promote scientific thinking in young children. Science remains to be a remote subject for young children and teachers shy away from doing science in the classroom. This situation would only leave a void in the young children's inquisitive mind and shifts their interests to other non-science fields. Therefore, this research aims to design classroom activities that could promote children scientific concepts and thinking**.**

Research Objectives

The objectives of this study is to:

1. Develop a 'Jom Teroka dan Selidik Sains' teaching module for 4 years old children.

2. Determine the validity and reliability of the 'Jom Teroka dan Selidik Sains' teaching module.

Methods

The construction 'Jom Teroka dan Selidik Sains' module involved two stages. The first stage was exploring and evaluate the current practices for doing science through exploration and investigation in the early childhood classroom. In this phase, a needs analysis was carried out through a desk review of the curriculum, followed by classroom observation and in-depth interview with the teachers and children. The data collection tools include checklist, video and interview transcripts. Data collected were analysed using the NVIVO software to analyse qualitative data and identify emerging themes. Based on the data, it showed that there was a gap between intended and implemented of science related curriculum for 4 years old children. That information were used to develop the 'Jom Teroka dan Selidik Sains' Teaching Module.

The second phase was the development of 'Jom Teroka dan Selidik Sains' Teaching module based on Gagne's Nine Events of Instruction. The teaching module comprises a series of lesson plans related to early science for 4 years old children. The model has proposed a systematic process to develop strategies and create activities for classroom teaching and activities. The nine events provide a framework for an effective learning process. Each step addresses a form of communication that supports the learning process. The model was chosen as it was appropriate with the instructions carried out at the childcare centers. Figure 1 illustrates the Gagne's Nine Events of Instruction.

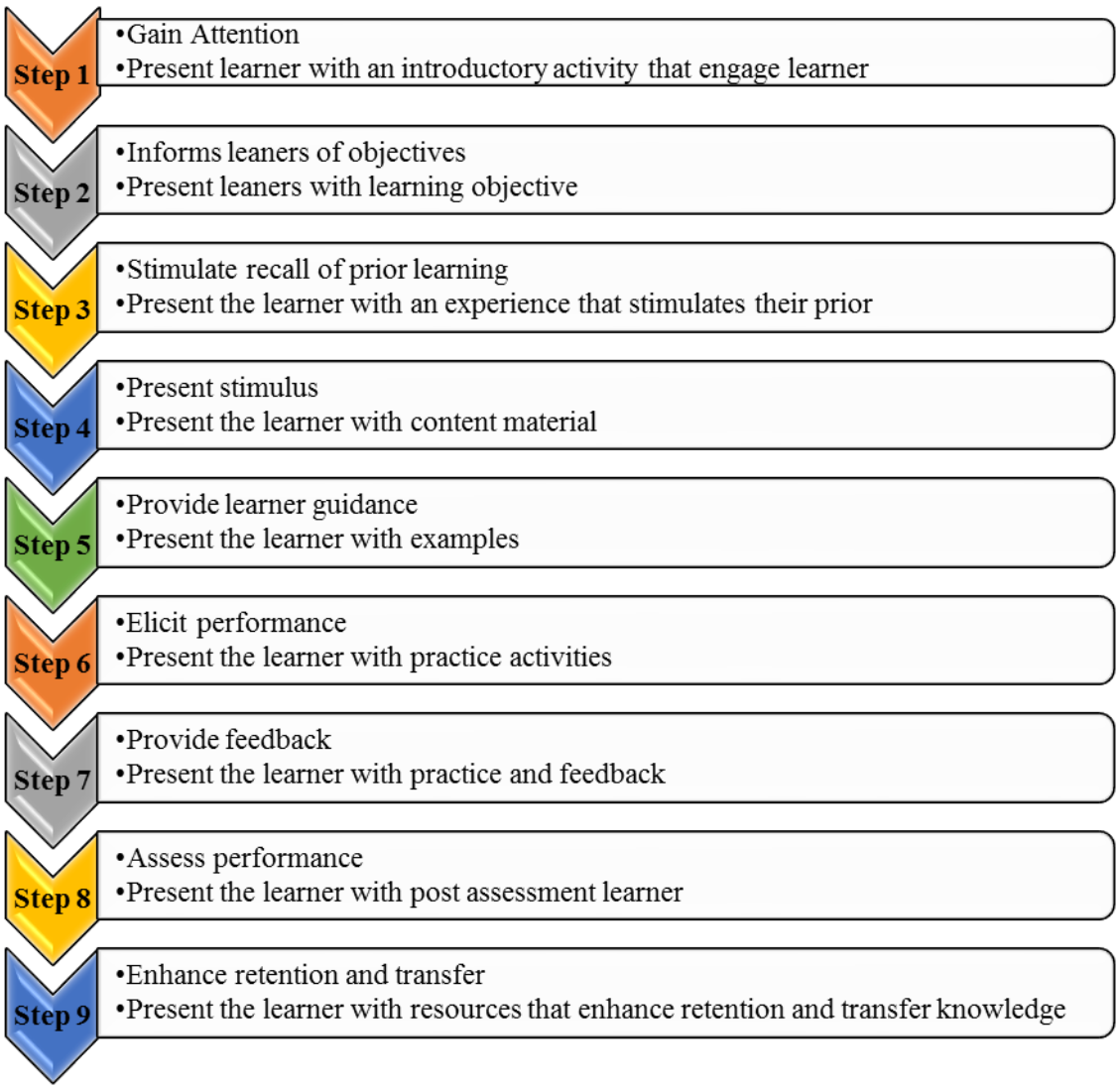


Figure 1 Gagne's Nine Events of Instruction

The Gagne's Nine Events of Instruction was embedded with Explore, Experiment, and Experience (3E) Learning Cycle model through play in designing the teaching module. The 3E Learning Cycle begins with the children engage in exploring the environment by using their senses. They may hold, feel, or taste the objects or see the phenomenon through naked eyes or appropriate devices such as magnifying glass or microscope. Then the children proceed to the second stage of the learning cycle which is Experiment. At this stage, children conduct the activities that was planned by teachers prior the lessons. The children may conduct the activity as a group or an individual. Lastly, children may apply knowledge or skills that they have acquired from prior activities to solve a real life problem. Figure 3 shows the 3E Learning Cycle Model

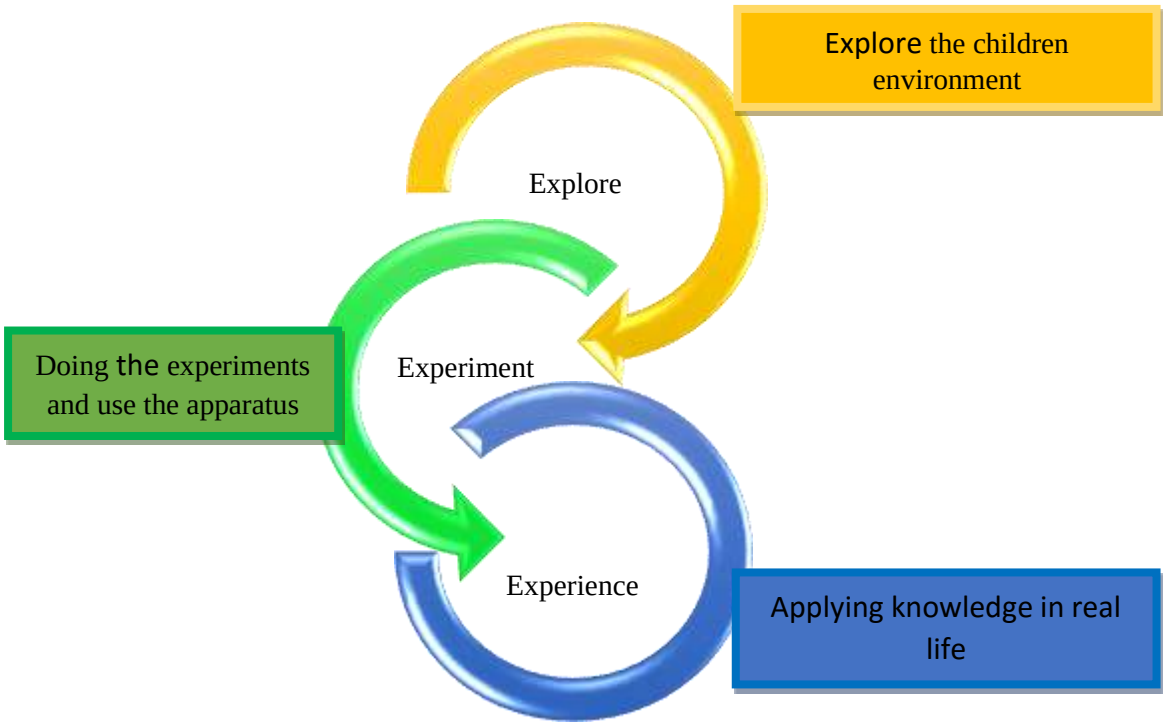


Figure 2 the 3E Learning Cycle Model

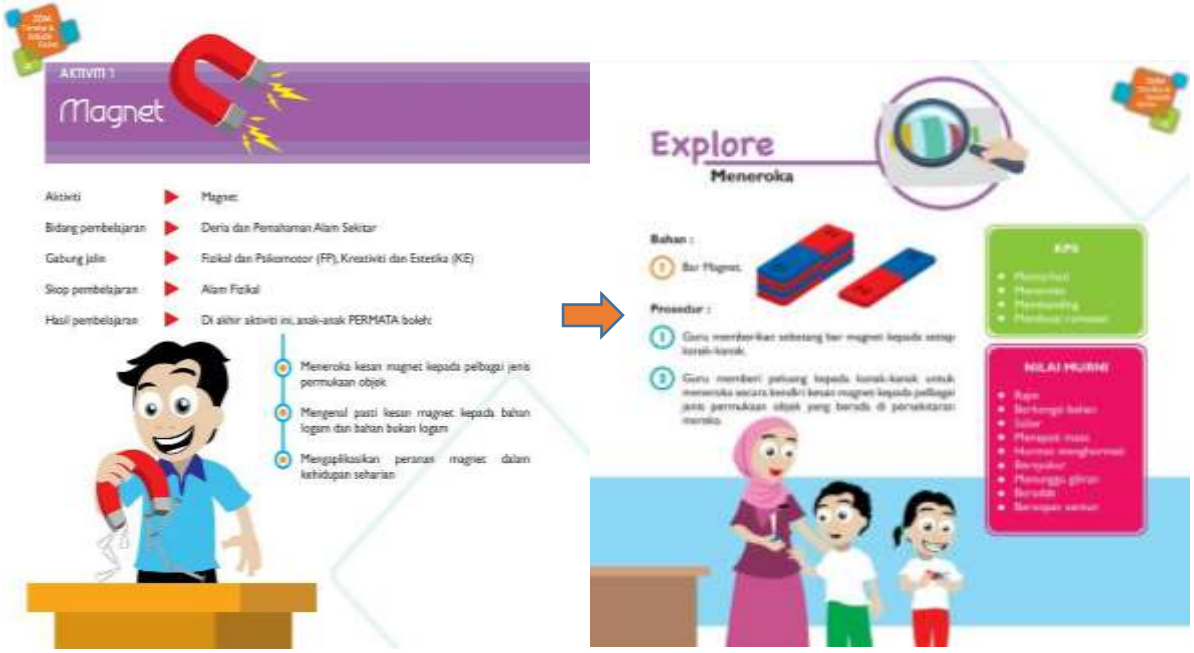
Findings

Characteristics of Module

The module covers four learning areas which are 'physical world', 'living world', 'material world' and the universe. The classroom activities that may engage children with hands-on and minds-on activities in doing science through exploration and investigation. All the activities are designed according to Gagne's Nine Events of Instruction that embed with the 3E Learning Cycle model. The concept of learning by playing is applied as it may promote the child's interest and creates interesting learning atmosphere.

Overall, this module comprises of 10 learning activities that covers four learning areas. Each learning area consists of several learning activities. The first learning area is known as 'physical world' that cover topics related to objects around the children. The activities suggested for this learning area are identifying the charatersitics of magnet and the properties of water. The second learning area is 'material world' that compose of activities to investigate the charateristics of sinking and floating objects and identify texture of jelly. The third learning area covers topics related to living things. The activities suggested in the teaching module are observing seed germination and identifying different types of animals. Lastly 'universe' is the forth learning area covers topics related to natural phenomena such as rain, volcano and rainbow. For this learning area, two activities are planned to study the eruption of volcano and the formation of rainbow. At the end of each suggested activity, there are suggested assessment methods, closure, and

rooms for teachers to reflect upon thier lessons. The suggested activities in 'Jom Teroka dan Selidik Sains' Teaching Module are based on the needs analyses that carry out at the beginning of the study. The topics are frequently taught and misinterpreted by teachers. Figure 3 illustrates a flow of lesson related to the characteristics of magnet:



dapat dipindahkan daripada dasar akuarium ke dalam bekas kosong.

5. Dalam satu jangka masa yang ditetapkan, kanak-kanak secara berkolaborasi akan berusaha memindahkan klip-klip kertas tersebut.

6. Pembelajaran ini sesuai dijadikan sebagai permainan secara berkumpulan.

Penutup

1. Dengan menggunakan Lembaran Aktiviti Magnet, kanak-kanak dimintа menentukan objek yang memberi kesan dan tidak memberi kesan terhadap magnet.

Pentaksiran

Hasil pembelajaran	Pentaksiran kanak-kanak		
	Tinggi	Sederhana	Rendah
1. Kanak-kanak berupaya menemuka secara kendiri dengan menggunakan magnet yang dibekalkan.			
2. Kanak-kanak boleh mengelaskan objek yang memberi kesan kepada magnet dan tidak memberi kesan kepada magnet.			
3. Kanak-kanak boleh menamakan kesan magnet pada permukaan yang berbeza-beza.			
4. Kanak-kanak boleh menyatakan sebab mengapa sesuatu objek itu memberi kesan kepada magnet.			
Rasa			
Lebih daripada 80% kanak-kanak berjaya mencapai hasil pembelajaran	Lebih daripada 50% kanak-kanak berjaya mencapai hasil pembelajaran	Kurang daripada 50% kanak-kanak berjaya mencapai hasil pembelajaran	

Lembaran Aktiviti Magnet

Tandakan √ bagi objek yang boleh melekat pada magnet dan X bagi objek yang tidak boleh melekat pada magnet

Objek	Tandakan √ atau X
	
	
	
	

Figure 3 A lesson plan to identify the charateristics of magnet

Validity and realibility of 'Jom Teroka dan Selidik Sains' Teaching Module

The content of module has been validated by three experts who are experienced in early childhood education as well as the construction of the modules and curriculum. Three dimensions of the teaching module were validated that include content knowledge, learning objectives, and learning activities. The average percent of approval among experts in every dimension were ranged from 80% to 85%. This value shows that all the dimensions of the module have good validity. Suhaimi et al. (2013), 80% of experts' agreement are acceptable in verifying the contents studied. A pilot study was conducted to identify the reliability of the teaching module. The pilot study was conducted to 30 early childhood teachers. The Alpha value obtained was 0.81. The reliability coefficient value fulfilled the requirement as stated by Hair, Black, Babin, and Anderson (2010) with the strength of the relationship is very good. Thus, 'Jom Teroka dan Selidik Sains' Teaching Module is acceptable to be used in assisting teachers to conduct activities appropriate with the early science classroom.

Conclusion

This research confirmed that 'Jom Teroka dan Selidik Sains' Teaching Module is capable of facilitating children in learning science through exploration and investigation. Children have the opportunity to explore, experiment and experience new things as they can to talk about what is happening around them, remind of events that have happened before or make suggestions to solve problems. The suggested learning activities are based on learning through playing approach as it indirectly gives children chances to grasp scientific concepts and skills. It helps to build self-worth by giving a child a sense of his or her own abilities and to feel good about themselves. Other than that, all the instructions and activities in this teaching module demand children to think actively and reflectively. Therefore, this module is able to help teachers implement teaching and learning science for young children and stimulate children’s thinking.

The research reported in this article was supported by grant from Ministry of Education (MOE) Malaysia (Reasech Code: 2015-0185-106-04)

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