CHILDREN KNOWLEDGE ABOUT BUTTERFLIES THROUGH PROJECT APPROACH

Noor Ashikin binti Mohd Yusop
Norazizah binti Abdul Rahman
Sopia Md Yassin

ABSTRACT

The aim of this study was to investigate the conceptions and misconceptions of children, aged five years old related to science concepts about butterflies. Therefore, research findings were obtained through observation, unofficial documentation, and informal interviews with a focus group of five children. This research applied a holistic single-case study that involved 'Butterfly Case' in a kindergarten in Perak. From the investigation activity, children were able to learn about structures, eating habits, life cycles, and butterfly camouflage. In fact, the children represented new information about butterflies in the forms of drawings and models. This research proposed that Project Approach as a teaching and learning approach that need to be exposed in early childhood education because the children will have a chance to investigate in-depth on different topics of interests. Thus, this will influence a meaningful formation of the child's knowledge and experience to move towards scientific generation formation in the future.

Keywords: Project Approach, Preschool, Investigation, Science

INTRODUCTION

Green tropical rainforest that covered the Malaysia landscape provided natural habitat for many species of flora and fauna, where each of them has their own roles to conserve the natural ecosystem. Therefore, the diversity of butterflies is also large in numbers because of the high biomass source (Barlow, 1982). Butterfly species were estimated to be 1,200 and they populated many areas of the tropical rainforest (Fathihi Hakimi *et al.*, 2017). In fact, a research showed that Tasik Kenyir has the most diverse butterflies because of the natural environment that were being conserved and had an unpolluted forest (Fathihi Hakimi *et al.*, 2017). Butterflies play an important role in the ecosystem and also serve as biological leads on temperature change, humidity, wind, and light that occur in their habitat (Wood & Nesbit, 1969; Waltz & Covington, 2001). However, human greed of logging, without control had disrupted the natural habitat of butterflies. In fact, butterfly extinction caused a major effect on the local ecological system (Fathihi Hakimi *et al.*, 2017).

Therefore, to make sure that the species and habitat of butterflies can be sustained, one of the main aspect that should be recognized is to give exposure about butterfly species in the early education. This is because, children will inherit and will make sure that the Earth is preserved. In addition, an effective and reflective learning such as an investigation activity through Project Approach will help the children comprehend scientific knowledge, particularly about the butterfly, which is the focus of this research.

EDUCATION BASED ON PROJECT FOR PRESCHOOL CURRICULUM IN MALAYSIA.

In recent years, as early childhood education and infant and child care have become the focus of much attention throughout the world, Malaysia has also implemented and expanded its preschool education. Preschool education in Malaysia is positioned as the preparatory stage for primary education. As such, while preparing children for primary education, the curriculum of early childhood education is planned and implemented with a focus on children learning through play and project. Takes account of the need for children to pursue their own interests and play experiences. A child-centred curriculum in Australia also offers children the opportunity to make choices about what, how and whom they want to play and explore during project activities. This approach enables children to initiate and direct their own play with the support of interested and responsive adults. Educators foster children's growth and development by building on children's interests, needs and strengths within a safe and caring environment (Edwards, & Cutter-Mackenzie, 2011).

Education based on the project was considered as an excellent practice in learning process because the project will be prioritized during teaching and learning (Kaldi *et al.*, 2011). Besides, it was also an instructional method that allowed children to use their curiosity during exploration of a topic. These can be seen through the role of children when investigating, solving problems, and making decisions to create a project so that they can demonstrate their acquired knowledge during teaching and learning process (Katz *et al*., 2014).

However, the implementation steps of a project-based learning had a better structure because investigation topics were constructed based on 'Huraian Sukatan Pelajaran' (Noor Miza Abdul Rahman, 2015). In fact, given assignments were depended on the form of the project and the designated results of learning.

PROJECT APPROACH

Project Approach that was being focused in this study was introduced by Katz and Chard (2000), had a slight difference with project-based learning. This was due to the implementation of the child's learning process was unstructured. In fact, investigation topic was not being decided by their instructors, but it was more likely to a child's desire to know when exploring. Besides that, the research of Project Approachhad five main characteristics, including discussion, investigation, field study, knowledge representation and classroom display regarding all learning activities.

Therefore, there were three phases that were being explored by children through Project Approach, which was Phase I (Project Beginning), then Phase II (Project Development), and ended with Phase III (Project Climax).

a) Phase I

The project can be started with multiple ways that was chosen by instructors and children. Hence, a project started when a child or a number of children showed a deep interest in an object or a thing that is interesting. Occasionally, a project can be started when instructors introduced a topic that had been chosen based on the consent from both instructors and children. However, this would involve provocation from instructors, displayed materials or discussed object by the children (Katz, Chard & Kogan, 2014).

Besides exploration in Phase 1, instructors were able to guide the children from the aspect of vocabulary construction through discussion. In fact, the construction of vocabulary compilation helps instructors to plan a scope of discussion topic precisely along with the children. Other than that, addition of technical terms increased along the project. All information about a topic can be generated through individual web or in groups. The formation of the web provided a different source of spelling aspect and it is more informative (Helm & Katz, 2011).

b) Phase II

The second phase of the project was a phase to carry out an investigation to answer the question formed at the end of Phase I. Therefore, Phase 2 had multiple ways to collect data and to obtain new information. An approach used by instructors to obtain information, including, instructors plan a class field trip, invite an expert to discuss with children, and demonstrate expertise on a topic (Helm & Katz 2011; Katz, 2010).

The starter of the main characteristic of Phase II was, the children agreed to start an investigation based on main questions that was stated in Phase I. The discussion included a visited place for fieldwork and the attendance of expertise in class or in fieldwork. During this time, the children voluntarily worked with a small group on a specific subtopic while the teachers arranged activities that focused on a visit to a researched site or attendance of aome expertise.

c) Phase III

The goal of Phase III in this project was to resolve the project through the creation of artifacts or models. In fact, in Phase III, the children shared new knowledge and information among themselves through display materials on the wall, drama and dance, scrapbook, model and toys (Katz, Chard & Kogan, 2014).

An inaugural exhibition was the main part which will be organized by teachers so that the children were able to show their project findings to their friends from other classes. During the main event, parents were invited to see and to listen to the children explanation of the concepts that they learned during the project and the way they mastered the topic of interest and the procedure to build and create a project (Katz, Chard & Kogan, 2014).

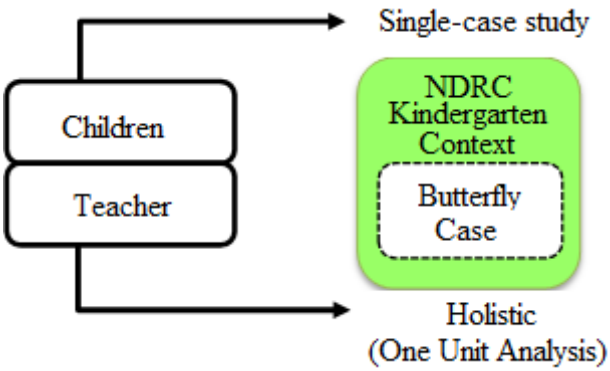
RESEARCH OBJECTIVE

Children present a variety of ideas and demonstrate deep interest in butterflies while conducting field work activities. However, there is the idea that children which is conflict with the scientific concept. Therefore, the aim of this study was to investigate the conceptions and misconceptions of children, aged five years old related to science concepts about butterflies before and after exploration and investigation through Project Approach.

METHODLOGY

The research focused on environmental project activity that was constructed through Project Approach. The goal of the activity was to explore children's knowledge about butterflies. Other than that, the involvement of parents and teachers showed that it can help the children to be insightful about the environment. Diagram 1 was a design used in this research. The research adopted a single-case design by Yin (2015), for the purpose of connecting empirical data to research inquiries and conclusions. The case study was an analysis process of real life issues based on contemporary events.

Diagram 1. Single-case design



According Yin (2015), the case referred to an institution such as a class, a project activity, a family, and a hospital. However, the single-case study of this research referred to a project activity about a butterfly which is conducted by children's.

Participants

In this research, participants are selected according to the needs of the study which is called purposive sampling. As a result, five children aged 5+ from the class of 6 Sakura who were able to express ideas spontaneously and have been active were selected as a participant.

Duration of Project Implementation

The associated implementation principle of Project Approach was based on interest and curiosity, the duration of children's exploration about butterfly was time consuming because it exceeded five months, which started on March till July. This was because of the children were not only investigating the structure but also eating habits, life cycle, and camouflage of butterfly.

Data Collection

In this research, data collection was done through interview, observation and document that was collected and handled by using a writing style in the form of storytelling or narrative and descriptive.

Critical observation was done by researchers for the purpose of data interpretation "non-verbal" that were obtained through all activities, events, and behaviors of research participants.

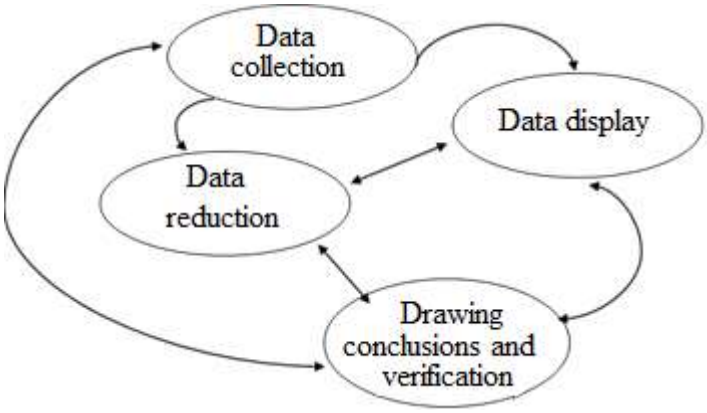
In the meantime, an unstructured interview method was used to get a full picture of observed things, besides the use of observation method. The unstructured interview was constructed for children to encourage them to express themselves and give opinions based on their own perspectives. Most of the unstructured interviews were not recorded, but were written in field notes. Therefore, questions were asked spontaneously and research participants were free to respond according to their own opinions without being restricted to any particular answer. The topic or question content that was asked to the children was not arranged prior to the interview, but related to particular aspects that were relevant to research questions.

Besides observation and interview methods, data were also obtained through unofficial documents that were created by the children in the form of sketches, notebooks, models and pictures from investigation activity that were relevant to this research. The unofficial documents were really useful for researchers to make triangulation of data that had been collected and helped researchers to comprehend a phenomena (Creswell, 2014).

Data Analysis

The data analysis process was done when the data collection had been completed. After collecting data, researchers started to compile data substantially through an analytical process. Data from the research had been analyzed by using method of content analysis based on themes (Miles & Huberman, 1994) and narrative analysis. The collected data of the research including, observation, interview, and proof of documents had been analyzed based on an approach by Miles & Huberman (1994), which had three main components including, (1) data reduction, (2) data display, and (3) drawing conclusions and verification (Diagram 2).

Diagram 2. Interactive data analysis. Adapted from "Interactive Model" by M.B. Miles and A. M. Huberman, 1994, pg.12.



Resercher make the process of selecting, focusing and transforming the data contained in observation and transcripts. These activities are performed so that the less relevant data can be isolated. The theme codes related to the focus of the study are determined using the "provisional coding" method. Next, the "pattern coding" done to the codes that have same characteristics, that is grouped in the same theme or category. Accordingly, the data is systematically presented using the tree diagram and table (Table 1). For the purpose of reviewing all completed data, five panel were selected to review and validate each theme, subtype, category, subcategory and indicators used by the researcher.

RESULTS

During the first phase, children around 5+ years old from the class of 6 Hibiscus had started field work at Butterfly Park in Kuala Lumpur. During the field work, the children were given the freedom to sketch objects around them. They seemed really happy when they saw different colors of butterflies flying in the park (PB (1) O/RV-14/6/16, paragraph 10).

During the exploration activity, the children's interest focused on a butterfly on a hibiscus. They started to ask questions for the teacher (PB). Questions included are:

PE1 "Why does the butterfly eats a flower?"

PE2 "Why does the butterfly has horns?"

In the meantime, observation data showed that PE5 child started to observe the butterfly closely. The PE5 child found out that the butterfly was "extracting water using its tongue". The children started discussing about the question they had:

PE5 "Teacher, is that a tongue?"

PB Do you all think the butterfly has a tongue?

The children answered simultaneously. "Yes, they do!

PE3 "Teacher, why does the butterfly extracting the water?"

PE4 "Because the butterfly is thirsty!"

PE3 "Teacher, does it uses its mouth?

PE4 The butterfly uses its nose! Teacher, the butterfly does not a have mouth, isn't!

(PE (1) O/RV-14/6/16, paragraph 13)

At this stage, the children have not comprehended the basic structure of a butterfly. However, activity outside the class and *'hands-on'* had positive impacts on child investigation. Exploration by the children became more interesting when some of them started to have an interest in the patterns and colors of butterflies. PE4 child asked, "Why does the butterfly has dots?" while PE3 child wanted to know "why does a butterfly has so many colors?" (PE (1) O/RV-14/6/16, paragraph 14).

In addition, children also had the chance to see different shapes and colors of a real pupa that existed in nature. Observation data (PE (1) O/RV-14/6/16, paragraph 15) showed that children started to sing a song about the life cycle of a butterfly. Some of the lyrics were:

"Dari ulat jadi kepompong,
ulat hidup dalam kelongsong,
sampai masa kepompong pecah…pom!
jadi rama-rama yang indah.
Rama-rama terbang merata,
Sungguh cantik aneka warna,
Hisap madu di pohon bunga,
Tapi sayang hidup tak lama"

However, observation data showed that the children only memorized the lyrics instead of understanding the life cycle of a butterfly. This can be seen when the children started to ask questions to their teacher.

PE6 "Teacher, what is a pupa?"

PB "Who can help Afiq with his question (not a real name)

PE3 "Pupa is… the butterfly baby".

PE5 "Teacher, what is Chrysalis?"

PE3 It's the butterfly baby!

(PE (1) O/RV-14/6/16, paragraph 16).

Besides that, the children also showed an interest to keep the pupa, a child said "teacher, can we keep a pupa?" (PB (1) O/RV-14/6/16, paragraph 17).

The results showed that the children were unable to recognize the real life cycle of a butterfly. From their conversations, they stated that pupa was a place for butterflies to get food. "*Actually, the pupa keeps its food in here. The butterfly will eat them to grow up*" (PB (1) O/RV-14/6/16, paragraph 17). In fact, proof of documents also showed that the children had a misconception on the structure of a butterfly. The children assumed that there were only two parts of "body" structure of a butterfly. The misconception can be detected through their drawings (DTR18-14/6/16).

Diagram 3. Sketches of physical structure of a butterfly

Therefore, on Jun 27, 2016, the children continued their investigation with a help of a teacher that acted as a scaffolding during the learning process. The teacher started the learning process through a book reading, "*Do you know the most scary, hairy, creepy insects and spiders in the world*?" as a reference to get information about butterflies. After examining pictures and labels, the children were able to recognize a few structures of a butterfly. Some of the structures illustrated in the book, including *forewing, hind wing, legs* and *antenna* (Photo 2). The children were only able to read and say simple words that were familiar to them such as "wing" and "legs". However, their teacher helped them with difficult words such as *forewing, hind wing* and *antenna* and *proboscis* through the phonic method (PE (4) O/RV-27/6/16, paragraph 7).

Other than that, the children also asked questions to their teacher to learn about the function of *proboscis*. Hence, the teacher explained that the structure was 'trunk' and it was not a tongue. In fact, the proboscis was used to extract honey.

PE3 "Teacher, teacher, *proboscis* is the tongue, isn't. Just like the other day it used it to drink water!

PB "Dear kids, we called *proboscis* the 'trunk'. Yup… it is used to extract the honey.

The discussion between teacher and children to solve problems through reading was helpful to recognize the structure of butterflies correctly. In fact, they can learn new scientific words with the right terminology (PE (4) O/RV-27/6/16, paragraph 4). In addition to a book as a source of information gathering, observation data showed that the children were also exposed to web browsing. Initiative exploration helped the children to get answers regarding the function of patterns and colors on the butterfly's wings through a slide presentation related to animal camouflage such as owl and lizard.
The children also were able to draw conclusions that butterflies need to camouflage to protect themselves from the predators. A child said, "*So, a butterfly has many colors because it wants to remain unseen from the predators*". (PE (6) O/RV-13/7 (paragraph 7). Besides that, observation data, (PE (7) O/RV-14/7 (paragraph 1) also showed that children played camouflage activity to apply the new knowledge as a way to protect ourselves from being tracked by predators (Photo 1).

Photo 1. Children activity of camouflage

The activity was significant to give a direct experience of how animals protect themselves from predators. As a result, the children were able to grasp a concept easily when they were playing. Besides that, parents also play an important role to make sure that exploration activity was a success and to give a good impact during their learning process. For example, Mrs. PD helped to build a vivarium to fulfill the deep interest shown by her child to keep butterflies. The interest shown by PE3 caused his/her mother to catch a butterfly, caterpillar, and pupa in their house compound to be placed in a vivarium that was made from an aquarium (DTRA11, 4/8/16).

Therefore, the information regarding metamorphosis process was shared with the other friends (Diagram 13). Avelin explained confidently and asked her friends to observe the white eggs on a lime leaf. Other than that, PE3 also stated that the leaf was used as a food source for the growth of caterpillars. However, the children found out that all butterflies they had died on September 27, 2016 (Photo 2). After discussing with the children, they assumed the butterflies died because they were kept in a vivarium. Because of that, the children learned that an adult butterfly need to be freed to their own natural habitat.

Photo 2: a. Information sharing session about the metamorphosis of a butterfly b. Children were observing died butterflies

Later, the children expressed their thoughts to make a chart of a life cycle of a butterfly. They said, "*Teacher, what if we make a fake butterfly! Can we?"* (PE (11) O/RV-4/8/16, paragraph 4).

The children made a model construction of a butterfly life cycle (Photo 3) which proved that they had grasped the concept correctly and accurately. In fact, when they were asked about the structure of the butterfly body, findings showed that most children were able to give an answer, "*a butterfly has three parts of body".* Besides that, the children used recycled materials such as bottles, papers, and boxes to create butterfly models, which showed that the children were applying the new knowledge in the form of 3D objects (PE (13) O/RV-8/9/16, paragraph 4).

Photo 3. A chart of the life cycle of a butterfly and 3D model of a butterfly by using recycled materials


To make sure that the inaugural exhibition for Phase III was accomplished, the children created a butterfly house with the cooperation from the parents. Findings showed that during the exhibition, the children were able to explain every part of the new knowledge they learned accurately. In fact, observation data also showed that the children were more confident to deliver the discovered information to the audience that visited their booths (Photo 4)

Photo 4. Project construction and inaugural exhibition

Table 1: The comparison of children's knowledge before and after Project Approach activity.

Category	Current knowledge (Before Investigating)	New knowledge (After investigating)
Structure	Has horn	Antenna
	Has tongue	Proboscis or trunk
	Has two body parts	Has three parts
	-	*forewing*, *hind wing*, *legs* and *antenna*
Eating Habits	Eat flower	Extract honey
Life Cycle	Chrysalis	Pupa
Camouflage	-	Hiding from predators

Therefore, research findings showed that the level of children's knowledge about butterfly increased, when they have an initiative investigation and exploration activity through Project Approach. In fact, the children were able to correct the scientific concept regarding the structure and the eating habits of a butterfly. Furthermore, the children were able to grasp the scientific concept of the structure, eating habits, and the life cycle of butterflies when they obtained related sources through books, internet, parents and teachers. In fact, the children's ability to grasp the concept related to a butterfly can be seen through sketches, models, and the ability to answer the questions that were asked by their friends, guests, and administrators that visited their exhibition.

CONCLUSIONS

The existing knowledge in children headed to a conceptual understanding that was learned when interacting with their surroundings, which contradicted to scientists' views (Wan Nur Fatin Izzati Wan Mustaffa & Lilia Halim, 2016; Svandova, 2014). Hence, research findings showed that Project Approachstresses on in-depth exploration and investigation about a topic, which supported the children cognitive developments. In fact, the children were able to learn new things, including scientific concepts about an animal, a plant, or natural phenomena that they observed. Indeed, the results also concluded that the children learned many terminolgy in both Malay and English besides their scientific attitude were also improving when solving a problem (Helm & Katz, 2015; Katz, Chard & Kogan, 2014; Harlen, 2014).

Other than that, the result conclude that Project Approach was a learning way to give opportunities to children's to initiate their learning process base on their interest and inquiry. Besides, children are allowed to use realistic resources and material to ensure that an investigation was explored siccessfully by the children.

REFERENCES

Barlow, H. S. (1982). An introduction to the moths of South East Asia. *The Malayan Nature Society*, Kuala Lumpur, Malaysia.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* (4th ed.). USA: SAGE.

Edwards, S., & Cutter-Mackenzie, A. (2011). Environmentalising early childhood education curriculum through pedagogies of play. *Australasian Journal of Early Childhood*, *36*(1), 51.

Fathihi-Hakimi Rosmidi, Amirah Azizah Zakaria, Amalina Adanan, Rosanira Mohammed, Muhamad-Aidil Zahidin & Mohamed Tajuddin Abdullah. (2017). Checklist Of Butterflies In Pulau Perhentian And Pulau Bidong, Terengganu. *Journal of Sustainability Science and Management*, *12*(1), 40-48.

Harlen, W. (2014). Helping Children's Development of Inquiry Skills. Inquiry in Primary Science Education (IPSE), 1, 1, 5-19. Muat turun dari http://www.esera2013.org.cy/conference.

Helm, J. H & Katz, L.G. (2015). *Becoming young thinkers: Deep project work in the classroom*. Teachers College Press. ISBN 978-0-8077-5594-5.

Helm, J. H., & Katz, L.G. (2011). *Young investigators: The project approach in the early years*. Teachers College Press. ISBN 978-0-8077-5153-4

Kaldi, S., Filippatou, D., & Govaris, C. (2011). Project-based learning in primary schools: effects on pupils' learning and attitudes. *Education 3–13*, *39*(1), 35-47.

Katz, L. G, & Chard, S. C. (2000). *Engaging children's minds: The project approach*. Greenwood
Publishing Group. ISBN 1-56750-501-5.

Katz, L. G, Chard, S. C. & Kogan, Y. (2014). *Engaging Children's minds: The project approach-third edition*. United Stated of America: Praeger. ISBN 978-1-4408-2872-0

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expand sourcebook. (2nd ed).* Thousand Oaks: California.

Noor Miza Abdul Rahman. (2015). *Pembinaan Modul Berasaskan Pendekatan Projek Untuk Meningkatkan Kemahiran Berkomunikasi Murid Tadika* (Tesis Doktor Falsafah tidak diterbitkan). Universiti Sains Malaysia).

Wan Nur Fatin Izzati Wan Mustaffa & Lilia Halim. (2016). Keberkesanan Pembelajaran Hands-On Dalam Mengatasi Miskonsepsi Litar Elektrik. *Journal of Education and Social Sciences, Vol. 4*, (June).

Wood, B. J., & Nesbit, D. P. (1969). Caterpillar outbreaks on oil palms in eastern Sabah. *Planter, Kuala Lumpur*, *45*(518), 285-299.

Yin (2015),

Yin, R. K. (2015). *Qualitative research from start to finish.* New York: The Guilford Publication.

Authors:

Noor Ashikin binti Mohd Yusop
National Child Development Research Centre (NCDRD)
Universiti Pendidikan Sultan Idris
noorashikinmohdyusop@gmail.com

Norazizah binti Abdul Rahman
National Child Development Research Centre (NCDRD)
Universiti Pendidikan Sultan Idris
norazizahabdulrahman@gmail.com

Sopia Md Yassin
National Child Development Research Centre (NCDRD)
Universiti Pendidikan Sultan Idris
sopia@fsmt.upsi.edu.my