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Through Languages, Education, and
Tourism*

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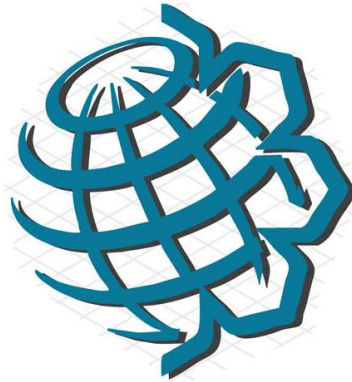
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2019



SUSTAINING GLOBAL DEVELOPMENT GOALS
THROUGH
LANGUAGES, EDUCATION, AND TOURISM

**PROCEEDING OF ILTC 2019
(ENGLISH LANGUAGE)**

INTERNATIONAL LANGUAGE AND TOURISM CONFERENCE
2019

*Sustaining Global Development Goals Through Languages,
Education, and Tourism*

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ALGORITHM AS A PROBLEM SOLVING TECHNIQUE FOR TEACHING AND LEARNING OF THE MALAY LANGUAGE

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ABSTRACT

The aim of the study was to determine the effectiveness of using scratch program to teach Malay language subject. 32, 4th year students in a primary school of Seremban district participated in the study. A case study was used. The teachers teach Malay subjects using scratch programs with the theme of agriculture and title of food product from agriculture. The students were to arrange the basic words into grammatical sentences based on the scratch program and write a cake recipe using an algorithmic technique, a series of instructions contained in the scratch program. This conceptual teaching and learning algorithm was conducted in five steps namely the induction set; step 1; step 2; step 3; and enrichment and recovery. Students could understand the concepts of algorithms taught and did not require recovery activities. This implies that the algorithm concept of how to prepare a cake through a scratch program has been fully understood by the students. Students are also excited about the algorithmic techniques and the scratch program generated. They remain focused throughout the session which shows that the use of algorithms and scratch programs is better than conventional methods in teaching the Malay Language.

Keywords: Scratch program; Algorithm; Basic words; Grammatical; Instruction

1. INTRODUCTION

Computational Thinking (CT) is a new approach in solving problems. This approach uses the methods in Computer Science to solve problems or execute a task (C.A.R. Hoare and N. Wirth, 1972). Nevertheless, computational thinking or CT is not merely using software or computer programs alone but is also interlinked with information and communication technology (ICT) and computer science based on problems; tools; action (praxis); solutions; concepts; and social needs as shown in Figure 1, the Triangle of Computational Thought.

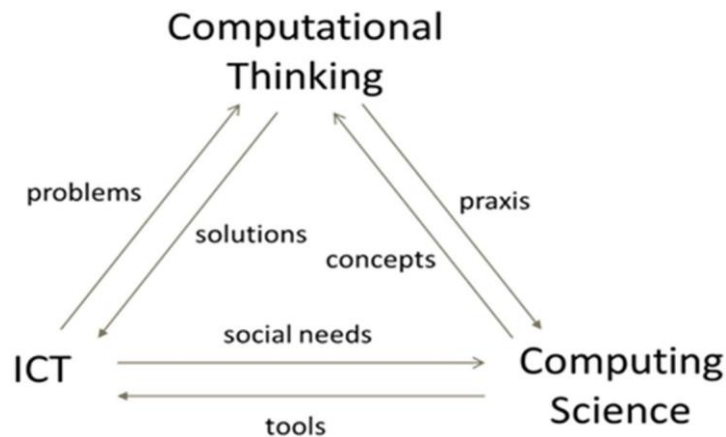


Figure 1 : Triangle of Computational Thinking
Source : C.A.R. Hoare and N. Wirth, 1972

1. PROBLEM STATEMENT

According to N. Wirth (1973), CT is a combination of Algorithms and Data Structures that produces the Program. Thus, CT is a combination of information basing on computing work to solve problems. The most difficult part of CT is characterizing a problem. Four main techniques are utilized in characterizing CT-based problems, namely:

- a. Decomposition
- b. Pattern recognition
- c. Pattern generalisation/abstraction
- d. Algorithm design

Decomposition

Decomposition refers to the identification of information needed to solve a problem. Information is summarized into multiple fractions. Furthermore, the breakdown of the information is identified to address the breakdown of the problem as shown in Figure 2.

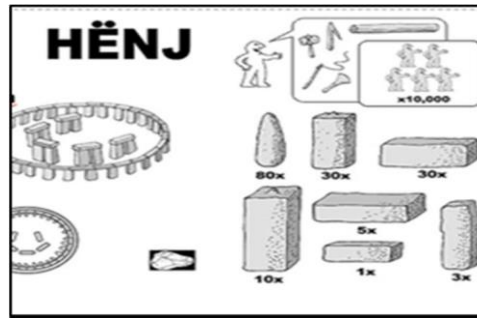


Figure 2 : Decomposition
Source : N. Wirth (1973)

Pattern Recognition

Pattern recognition comprises two aspects: to identify patterns in the problem; identify patterns in the information. When identifying patterns in the problem, two questions must be asked namely,

- a. Have I seen or experienced such problems before?
- b. How was this problem different from my previous problem ?.

Accordingly, four questions are asked on the pattern contained in the information:

- i. How is the structure of this information?
- ii. Is there any relevant links in this information?
- iii. Have I seen this information in such pattern before?
- iv. How is this information different from the information I have ever seen?

Pattern Generalization

Pattern generalisation or Abstraction needs two questions and sub-questions as follows:

- a. What is the main issue in this problem?
 - i. Which part is static and how are the parts in the problem / sub problem arranged?
 - ii. Which part is changed?
- b. What is the information pattern in the problem?
 - i. Which information is static?
 - ii. Which information is changed?

Algorithm Design

Clear CT instruction to solve problems needs algorithm as follows:

- a. What are the steps contained in the information from the beginning until the

- end stage of problem solving?
- b. How do these problem parts link to each other?
- c. How does the information change in every step?

CT focuses on problem solving ranging from information, computing to the information structuring instead of computer programs like decomposition; abstraction; patterns; and algorithm. CT begins with a concrete assumption of a problem until the problem is solved using the algorithm set instruction.

1.2 RESEARCH OBJECTIVES

The objectives of this study are as follows:

- a. To determine the effectiveness of using scratch program in teaching Malay language in ways that students are able to:
 - i. write algorithm set instruction using a single sentence using scratch program.
 - ii. produce a cake recipe using an algorithmic technique, a series of instructions contained in the scratch program.

RESEARCH QUESTIONS

The research questions are as follows:

- a. How effective are the scratch program in teaching Malay language?
 - i. Are students able to write algorithm-based instructions using single and plural sentences based on scratch program?
 - ii. To what extent students can produce a cake recipe using the algorithm set instruction in the scratch program?

2. LITERATURE REVIEW

The CT approach began in schools in the Europe when the students compared the events that occur in the life of ancient Rome children with their own lives. These students also recorded a series of instructions in the life of the ancient Roman children. Teachers also emphasized role-playing and simulation methods for the students to better understand the series of instructions available. Teachers also guided students to apply the good values of ancient Rome children's lives, into the lives and careers of their future students (Barr, D, Harrison, J, Conery, L. (2011). The instruction series produced by students was an algorithm in CT approach.

Algorithm refers to a series of commands or set of rules to execute an assignment. MDEC and Jag Systems (2016) have categorized algorithms as online activities (i.e, scratch program) or offline (unplugged activity). The offline activity is to create a monster face and

appearance through a series of algorithm instructions, namely the algorithm 1 is about the the face and the giant form and the algorithm command 2 is how to paint the monster as follows:

Algoritma 1 is about my monster face and appearance:

- a. _____
- b. _____

Algoritma 2 is on how to paint my monster:

- a. _____
- b. _____

The scratch program is ideal for algorithmic concepts application in CT approach. Sprite or character in the scratch program is moved through a series of algorithm instructions as shown in Figure 3. The computer program also uses an abstract concept to solve a problem. Through the abstract concept, only a series of important commands are presented, while non-essentials are eliminated (Csizmadia, A and et al., 2015).

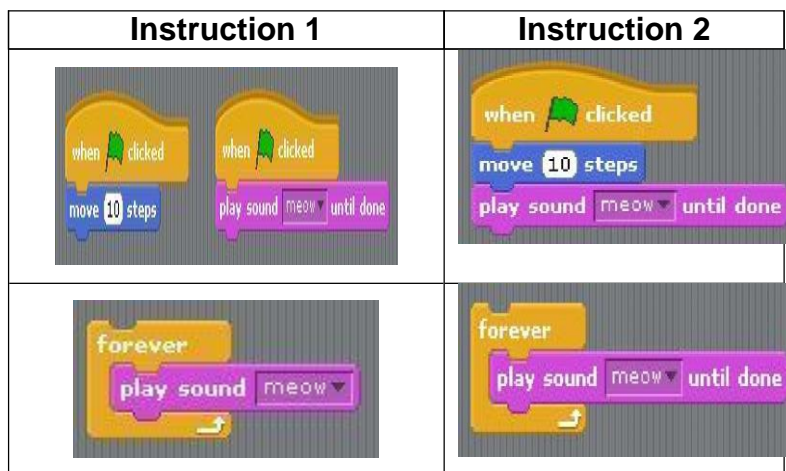


Figure 3 : Scratch Program Algorithm Instructions Series
Source : Researcher

3. METHODOLOGY

A survey was conducted with the observation technique among 32, 4th year students at a Seremban district primary school. Teachers taught Malay Language subjects using scratch programs. The theme was agriculture, and the title was food products from agriculture. This teaching and learning session had an objective of being able to arrange the words into grammatically single and plural sentences based on the scratch program based on the following Teaching Plans (RPH):

Lesson Name	Agriculture
Theme	Agricultural-based Food
Duration	60 mins.
Standard Content	3.3 Constructing and writing words, phrases, and sentences correctly
Standard Outcome	3.3.4 Constructing and writing single and compound sentences based on graphical materials correctly.
Existing knowledge	Students have learned single and compound sentences.
Objectives	<ul style="list-style-type: none"> □ To arrange the given words to be a single sentence based on the graphic material correctly. □ To write instructions using single and compound sentences to produce cake recipes based on the scratch program.
Materials and tools	<ul style="list-style-type: none"> □ Picture □ Computer □ Scratch Program

Steps:

		Activation	Duration:
Induction Set	Chicken Life cycle	1.Students peruse the given picture. 2.Students construct single sentences orally on the picture 3.Teacher assists the students in constructing the sentences.	4 mins Decomposition
Step 1	1.Oral conversation in the <i>scratch</i> program. 2.Agricultural based ingredients in the cake: □ Eggs □ Butter	1.Teacher shows the conversation using the <i>scratch</i> program. 2. Students are to read the script of conversation and identify agricultural-based ingredients in a cake. 3. Students have a question and answer session with teacher on the agricultural-based ingredients in a cake.	6 mins Abstraction
		Learn By Doing	Duration
Step 2	- <i>Scratch</i> Program - Mahjung Paper	1. Students are to discuss in small groups on how to write instructions on steps of baking cake	(10 mins) Inquiry Based Learning Algorithm

		<ol style="list-style-type: none"> 2. Students scrutinize scratch program conversations and write steps to prepare cakes in the mahjung paper. 3. A representative of each group present the results of their discussions to the class. 	
		Integration	Duration
Step 3	- Mahjung Paper	<ol style="list-style-type: none"> 1. Teacher compares the presentation of each group. 2. Teacher explains if there are groups that make mistakes in arranging steps in baking a cake. 3. Teacher associates students' assignments with cake baking activity in real life. 	(5 mins) Evaluation
		Summarize	Duration
Closure		<ol style="list-style-type: none"> 1. Teacher puts emphasis on pure values found in group activities (step by step and size accuracy for baking cakes). 2. Teacher praises the group who are successful in arranging the steps in cake baking and selecting proper material. 	(5mins)

Additionally, students are also asked to write a cake recipe using an algorithmic technique, a series of instructions contained in the scratch program. The algorithm used consists of five instructions, namely:

- a. Sift flour
- b. Mix sugar, butter and eggs and stir well in a mixer
- c. Mix the baking powder and dried fruit into the wheat flour
- d. Mix the wheat flour and dried fruits batter with sugar, butter and eggs batter
- e. Bake the dough for 45 minutes to 1 hour.

4. RESULTS

The findings of this study are based on the lesson implemented in a 4th year class based on four steps, namely the induction set; step 1; step 2; step 3; and enrichment activities.

Results and Induction set

The students are shown a picture of a life cycle of chickens as shown in Figure 4. Based on the picture of this life cycle, the students have constructed grammatical single sentences for example:

- The chicken in the picture is a hen.
- The eggs have hatched.
- A chick hatches from a chicken egg

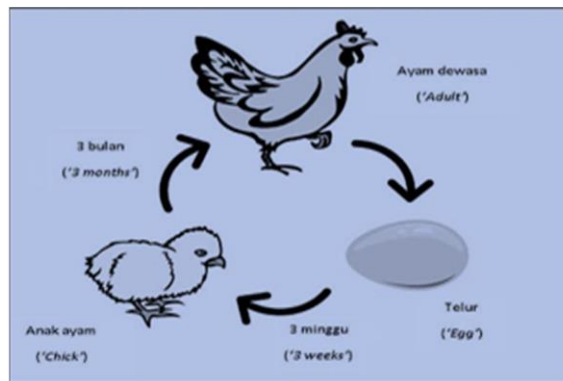


Figure 4 : Chicken Life cycle

Source : Researcher

Findings of Step 1

Teacher showed a scratch program conversation as shown in Figure 5. Students were able to read conversations and identify agricultural-based cake-baking ingredients. Next, the question and answer session was conducted on the agricultural-based ingredients in the cake.



Figure 5: A scratch program conversation Source : Researcher

Findings of Step 2

The scratch program was shown and students successfully listed ingredients based on agricultural products for example, butter; eggs; and granulated sugar, referring to a dialogue in the scratch program. After the dialogue in the scratch program was read, the students listened carefully to the steps of baking the cake as shown in Figure 6.



Figure 6: Steps in baking a cake

Source : Researcher

Findings of Step 3

Students formed four small groups as shown in Figure 7 and wrote steps to prepare cakes. Group representatives present their own group findings and four groups were able to write the correct steps in a cake preparation.



Figure 7 : Small group discussion and presentation Source

: Researcher

Findings on Enrichment Activities

Students were asked to write steps to prepare the cake using a single sentence based on the scratch program. Students were able to write these steps using a grammatical single sentence as shown in Figure 8. The examples of single sentences formed are as follows:

- a. First, the flour must be sifted.
- b. Stir sugar, butter and egg well.
- c. Mix flour and baking powder into the dough.
- d. Mix dried fruit and stir well
- e. Stir the dough well.
- f. Bake the dough in an oven.

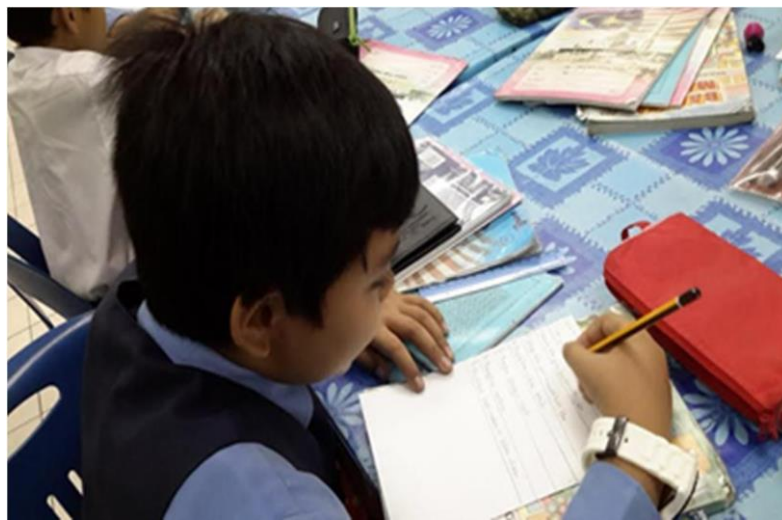


Figure 8 : Steps in enrichments activities

Source : Researcher

5. DISCUSSION AND CONCLUSION

Teaching and learning with scratch programs are particularly attractive to students in primary schools. Evidently, scratch programs are fun and easy to understand by students. Consequently, students are more focused in their learning. The use of the scratch program has led the students to write an algorithm-oriented instruction on baking steps with grammatical single sentences. Students are also not bound by the use of dull textbooks during teaching and learning process.

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