# Effects of PWIM in the ESL Classroom: Vocabulary Knowledge Development Among Primary Malaysian Learners

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## ABSTRACT

*The present quasi-experimental study examined the impact of pictures, via a modified version of Emily Calhoun's (1999) Picture Word Inductive Model (PWIM), on the English vocabulary acquisition of Malaysian Year 1 pupils in a rural national primary school. Meara and Buxton's (1987) Yes-No Recognition Test (YNRT) was adapted and further tested for reliability to measure the recall and retention of subjects' vocabulary size. A total of 60 subjects participated in the research, comprising two intact classes; one class formed the Experimental group and the other formed the Control group. The former underwent the intervention while the latter received typical classroom instruction. Results gleaned from independent samples t-tests revealed superior vocabulary scores at the posttest and delayed posttest levels by the Experimental group, denoting greater vocabulary knowledge recall and retention that reflects the effectiveness of the intervention in enhancing vocabulary acquisition among young Malaysian learners. This study and its findings are of significance to English language teachers, curriculum designers, policy makers, and scholars engaged in ESL/EFL research. It is also noteworthy that there exists a paucity with regards to in-depth research on the use of images for language learning among young learners, particularly within the Malaysian context.*

*Keywords: pictures; PWIM; vocabulary recall and retention; young learners; Malaysia*

## INTRODUCTION

Concern with the state of Malaysian younger workforce's English language proficiency propelled the present research. It is an unpropitious omen for the Malaysian society when its graduates have been touted time and again as being not of employable material due to their inferior proficiency in English (Hire in Asia, 2018). The previous government has certainly taken note and concern can be discerned in the various education reforms implemented over the decades with the Subject Grade Point Average as among the most recent attempt in helping students in the country to excel in the language. Other reforms include the Malaysia English Language Roadmap (2015-2025), Malaysia Education Blueprint (2013-2025) and the Primary School Standards-Based Curriculum for English language education (SBELC), introduced in 2011. Likewise, as mentioned by Campbell (2018), post Malaysia 14th General Election, the freshly minted government too needs to commit to a reform specifically targeting at raising English language proficiencies. In short, there exists a need for an effectual language learning approach to elevate the level of English among Malaysians.

Vocabulary knowledge remains the focal point in this research given its uncompromised role in language development and mastery. As Noorli and Imran-Ho (2018, p. 26) mentioned, "The tenet of a language description is in its words." Cumulative strength of previous frameworks on vocabulary learning and teaching has presented vocabulary knowledge as the key to the development as well as mastering of language skills. Researchers of second/foreign language learning such as Neuman and Kaefer (2018), McKeown and Beck (2014), Alemi and Tayebi (2011), Banta (2004), Biemiller (2010), Hunt and Beglar (2005), and Nation (1990) may have all stood firm on the significance of vocabulary knowledge though their respective views on the effectiveness of various interventions and models of teaching may be far from unanimous.

Marginally neglected, it was only from the late 1980s that research on vocabulary started garnering the attention it deserves (Tan, 2016; Eyckmans, 2004; Nation, 1997). The mounting interest on vocabulary knowledge development has led to an impressive corpus of studies in this field. However, uncertainties remain in extant literature on vocabulary instruction among young learners as research has so far been unable to reach a consensus on the more effective vocabulary teaching-learning approaches for this cohort. Additionally, there is a scarcity of available research related to the use of images or pictures for language learning among young and emergent learners, especially within the Malaysian context.

The Picture Word Inductive Model (PWIM), a teaching model developed by Calhoun (1999), has successfully being implemented by her to help learners of varying types and age groups in countries such America and Canada with their language learning. Engaging inductive thinking and concept attainment strategies, the approach primarily uses pictures to elicit words from learners and in the process, facilitate and enhance vocabulary and language development. Moreover, pictures have been commended as an instrument deemed potentially efficacious for vocabulary learning, particularly among young learners (Joyce, Weil, & Calhoun, 2015; Banta, 2004; Kress, 2000; Calhoun, *ibid.*). As put forth by Banta (*ibid.*), visual skills precede verbal skills, with very young children learning to "read pictures" well before they learn to read text. Therefore, this study strived to explore if this approach can similarly help to enhance learners' vocabulary knowledge positively in the Malaysian context and in doing so, help lay the foundation for greater English proficiency level among our learners.

## RESEARCH OBJECTIVES AND QUESTIONS

This study examines how a modified version of Emily Calhoun's (1999) PWIM impacts the vocabulary knowledge (size/breadth) recall and retention of Malaysian Year 1 pupils enrolled in a national primary school in a rural area in Malaysia. The following are the research objectives:

1. To determine if there is a significant difference in the vocabulary knowledge recall between the Experimental group and the Control group.
2. To determine if there is a significant difference in the vocabulary knowledge retention between the Experimental group and the Control group.

Thus, if analysed data shows positive significant difference in the results of Experimental group as compared to the Control group this denotes that the intervention is successful in enhancing the recall/retention of subjects' vocabulary size/breadth.

The following are the study's research questions and accompanying null-hypotheses:

**RQ1**

Is there a significant difference in the vocabulary knowledge recall between the Experimental group and the Control group?

**H$_{01}$**

There is no significant difference in the vocabulary knowledge recall between the Experimental group and the Control group.

**RQ2**

Is there a significant difference in the vocabulary knowledge retention between the Experimental group and the Control group?

**H$_{02}$**

There is no significant difference in the vocabulary knowledge retention between the Experimental group and the Control group.

RELATED LITERATURE

PICTURE WORD INDUCTIVE MODEL (PWIM)

Successfully employed by Calhoun (1999) since 1976, the PWIM is "an inquiry-oriented arts strategy that uses pictures containing familiar objects and actions to elicit words from children's listening and speaking vocabularies." (p. 21). Calhoun first experimented with PWIM in 1976 as a first grade teacher and she went on to teach older students and adult non-readers. Progressively, Calhoun extended to provide training in the PWIM approach to teachers of various levels, including special-needs teachers.

For instance, Calhoun et al. (2001) carried out an action research that implemented the model on a cohort of first graders. Additionally, in 2004 the PWIM was introduced in the classrooms of Saskatoon Public Schools in Saskatchewan, Canada with the launching of the "Literacy for Life" project that aimed to have all children from grade K to 12 reading at or above their grade level. Subsequently, Walford (2007) initiated a huge mentoring project that witnessed the involvement of sixty-six teachers and twenty-two associate teachers with pupils ranging from kindergarten to Grade 8 in Ontario. This eventually led to the implementation of PWIM in schools in Alberta and British Colombia. Meanwhile, in America, the Iowa Department of Education introduced PWIM in their elementary classrooms in schools in Iowa beginning 2008 as an effort to enhance literacy development.

Designed primarily to capitalise on a learner's ability to think inductively, the PWIM incorporates both the inductive thinking and concept attainment models of teaching into its own framework as well as encompasses some of Ramey and Ramey's (1998) developmental priming mechanisms that deal mainly with the positive cognitive, social and emotional outcomes of a person, especially that of a child. As a teaching model from the family of information processing, PWIM also applies cognitive psychology principles, encompassing knowledge, comprehension, application, analysis, synthesis and evaluation (Joyce et al., 2015). Originally intended as a major component of a language arts curriculum for beginning readers, the strategy is found to be largely effective with classes, small groups and individuals across all age groups (Calhoun, Poirier, Simon, & Mueller, 2001). The fact that PWIM can be applied with any group/type of learners is highly commendable, a noteble strength of the approach itself. As stated by Joyce, Weil and Calhoun (2004), PWIM serves not only as a literacy programme for very young learners but also as a "safety net" programme for older beginning language learners, thus forming the core of some highly effective curriculum.

PWIM leads learners into inquiring about words, adding lexical knowledge to their sight reading and writing vocabularies, discovering phonetic and structural principles, and

into using observation and analysis in their study of reading, writing, comprehending and composing. Basically, the approach leverages on learners' existing speaking and listening lexical, and their earlier exposures. This rendered the intervention not only highly flexible and comprehensive but fun and productive at the same time, essential attributes that make for some very effective classroom teaching and learning. The approach can be particularly beneficial for learners at the initial stages of language learning (Joyce, Weil, & Calhoun, *ibid*.)

A full sequence of a PWIM unit may vary between three days to two months. The teacher has final say on the length of units and the number of lessons within a unit as well, depending on the language objectives that he or she has for learners while taking into account the richness of the picture, the age, and language development level of learners. L2 use among learners is permitted when efforts are made to induce words form learners' existing vocabulary knowledge but the teacher is to give its equivalence in English immediately. It has been debated that usage of L2 has brought about expansion and upraised of vocabulary knowledge among bilingual learners (Arifur, Ngee, & Ramiza, 2018) which effectively describe Malaysian learners.

The basic lesson structure of the PWIM (stopping at vocabulary learning) is described as follows (Calhoun, *ibid.*, p. 23):

1. Select a picture.
2. Ask students to identify what they see in the picture.
3. Label the picture parts identified. (Draw a line from the identified object or area, say the word, write the word, ask students to spell the word aloud and then pronounce it.)
4. Read and review the picture word chart.
5. Ask students to read the words and classify them into a variety of groups. Identify common concepts to emphasise with the class.
6. Read and review the picture word chart (say the word, spell it and say it again).

In recent years, interest in PWIM has been detected within the region of Asia, namely in China, Taiwan and Indonesia. Jiang (2015) researched 30 seventh graders in China and found PWIM's influence positive on his subjects' narrative writing. Previously, in 2014 Jiang also investigated the impact of PWIM on the vocabulary acquisition of fourth and seventh graders from mainland China, as well as the possibility of a cognitive overload in combining words with pictures. Findings indicated no significant difference in subjects' vocabulary acquisition based on grade levels between the experimental and control group, and some felt cognitively overloaded with too many new words introduced and repetitions. However, majority perceived PWIM to have a positive effect on their English language learning.

There was also a PWIM study that looked at the scaffolding of EFL elementary learners' English literacy in a cooperative classroom. It involved three elementary Taiwanese English teachers and a group of fourth, fifth and sixth graders with data collected via observations and interviews (Feng, 2011). Although findings were based solely on perceptions, overall, the eleven months qualitative study documented positive findings: increased English vocabulary, improved ability to compose sentences, greater motivation towards learning English and subjects became more autonomous in learning.

Studies conducted by researchers in Indonesia were mainly experimental ones on the effectiveness of PWIM on literacy skills such as writing and communicative competence. For instance, Nurani and Rosyada (2017) investigated the impact PWIM has on the communicative competence of 47 eleventh-graders in a public secondary school in Jakarta. On the other hand, Harahap (2018), Kurniawan (2015) and Kartika (2013) explored PWIM as an alternative approach to teaching secondary school students descriptive writing. All

recorded improved writing skills. Similarly, Wahyuni (2016) and Yurfalah (2014) who conducted studies on PWIM and vocabulary learning on local learners in their country also posted positive results.

## THEORIES OF PWIM

PWIM, a model of teaching that stresses on interactive activities, primarily leverages on inductive thinking and concept attainment within the information processing family. Fundamentally, applications of this branch of psychology allow us some insights into how an individual understands, remembers and makes connections between thoughts and ideas as the cognitive domain in the model reflects how a person thinks, remembers and knows. On the other hand, interactive engagements allow for greater language practise which as stated by Chin, Karunakaran and Yap (2019) could infuse lessons with alleviated enjoyment and motivation to learn.

Calhoun (1999) adapted Hilda Taba's (1966) work to incorporate the inductive thinking concept into PWIM to enhance learners' abilities to build and extend concepts, as well as broadening their range of perspectives in which information is viewed (Joyce, Weil, & Calhoun, 2009). Learners are guided to develop his or her skills in interpreting data i.e. identifying and exploring relationships, and making references. They are taught to scrutinise collected information prior to compartmentalising them according to concepts. The effectiveness of the inductive thinking concept in augmenting learning has the support of researchers like Billing (2013) and Prusty (2009).

Exerting considerable influence in the PWIM model is concept attainment, a constructivist approach to teaching and learning drawn from the work of Jerome Bruner (Bruner, Goodnow, & Austin, 1956). As put forth by Bruner, Goodnow and Austin (1967), concept attainment is "the search for and listing of attributes that can be used to distinguish exemplars from nonexemplars of various categories" (p. 233). Learners, equipped with prior knowledge, exploit the processes of comparing and contrasting to ascertain the attributes of a concept within this instructional model. It serves as an effective avenue for learners to brush up their inductive reasoning and concept building strategies as they are provided with a wide range of organised information at diverse levels of development. According to Calhoun (1999), the guidelines for designing lessons are purposefully created with goals such as focus, conceptual control and converting conceptual understanding to skills in mind.

Additionally, within the framework of the PWIM that employs pictures as a stimulus for language development are the priming mechanisms for continued development in the Developmental Priming Mechanisms proposed by Ramey and Ramey (1998). Advancing the principle that causal factors in developmental discrepancies are irrevocably linked to young children and their intellectual performance and social competence, Ramey and Ramey (*ibid.*) advocate the need for these priming mechanisms to be present in children's lives on a recurrent and predictable basis. It is further hypothesised that inadequate exposure to the aforementioned mechanisms can negatively impact the cognitive, linguistic and social development of children. Fundamentally, the priming mechanisms as a whole involves mentoring in basic skills with exploration in learning. In the framework of the PWIM, teachers strive to provide a rich and responsive language environment for them aside from guiding learners in rehearsing and extending the newly learned skills of conceptualising words acquired inductively.

Additionally, with regards to memory for pictures, Paivio (1971) has been very consistent in his assertion that pictures are superior to words where coding and retrieval of stored memory are concerned and this forms the basis of his dual-coding theory. According to Paivio (1986), memory for images is far superior to memory for words as pictures are

coded more easily and can be retrieved more effectively than words. In tandem with Asch and Ebenholtz's (1962) position attributing higher recall to learning with pictures, the dual-coding theory states that while memory can either exist in verbal or image forms (or both), concepts that are concrete in nature are encoded into both systems whereas abstract concepts are only recorded verbally. Theorists such as Ally and Budson (2007), Mintzer and Snodgrass (1999), Nelson, Reed and McEvoy (1977), and Sheapard (1967) are convinced that the picture superiority effect is due to greater conceptual processing for pictures than for words. Simply put, the picture superiority effect is effective because it is easier to remember pictures than words.

In essence, vocabulary acquisition takes place through either the verbal or nonverbal cognitive process, or both. Thus, via the PWIM, learners utilise their sensory systems of logogens and imagens, whereby they think inductively and - together with the support of pictures containing familiar objects and actions - elicit words from their listening and speaking vocabularies. Subsequently, the learning is enforced with the use of printed words to enhance the recall and retention of the target word (Calhoun, 1999).

With regards to the present study, the intervention was implemented within a collaborative setting, a philosophy that centralises on small groups of students actively involved in completing assigned tasks and working towards a common goal with teachers merely functioning as facilitators. An umbrella term for diverse educational approaches involving joint intellectual efforts mainly by students, or students and teachers, is 'collaborative learning' (Smith & MacGregor, 1992). Collaborative learning has become a 21st century trend in education institutions where the traditional one-way method of teaching and learning (i.e. teachers teach and students listen) has transformed into a two-way approach (i.e. interactions between student-student, student-teacher, and student-content).

In short, theoretically, the PWIM appears to be an effective second language learning approach, targeting vocabulary enhancement, for young learners. This is further affirmed by the results garnered, via a three-tiered testing design (pretest, posttest, delayed posttest).

THEORETICAL FRAMEWORK

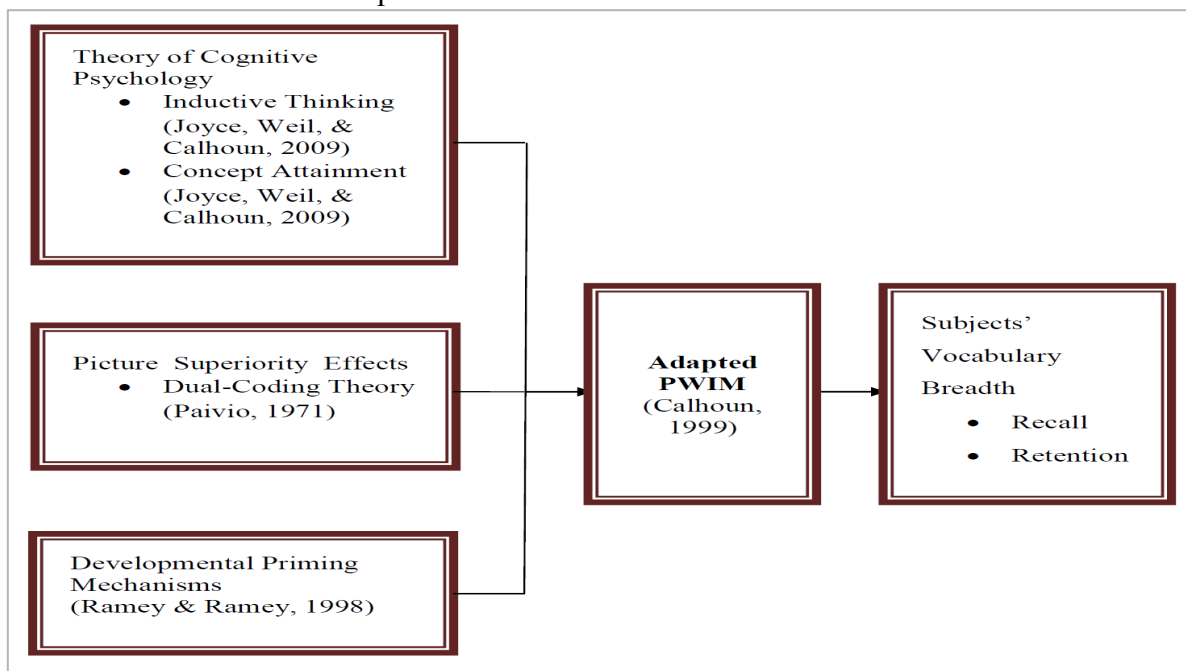The theoretical framework is presented as follows:



FIGURE 1. Theoretical framework of the present study

# METHODOLOGY

## SAMPLING AND PARTICIPANTS

The present study is a quasi-experimental research employing the purposive sampling method whereby research units or subjects are selected based on precise purposes (nature of research objectives) to address a study's research questions (Teddlie & Yu, 2007).

The study involved two intact classes comprising 60 Malaysian Year 1 pupils in total. One class/group formed the Experimental group and the other formed the Control group. Each group was made up of 30 participants. The coin-flipping method was utilised to designate the groups (i.e. Experimental and Control). All the participants were of a similar age and lived within the vicinity of the school (a rural area in Malaysia), a likely indication of similar or comparable socioeconomic status.

## INSTRUMENTS AND ANALYSIS

The study utilised these instruments:

1. Picture extracted from Year 1 textbook and enlarged (see Appendix E).
2. Printed word cards.
3. Yes-No Recognition Test (YNRT); a preliminary test (see Appendix A) was administered (for selection of words) prior to the designing of the stimulus items, and all test materials were also subjected to reliability testing.

The preliminary vocabulary test, covering the entire word list provided in the Dokumen Standard Kurikulum dan Pentaksiran Bahasa Inggeris (2015), was administered with the sole purpose of selecting the words to be taught during the intervention. Malaysian Year 1 pupils from a national primary school within the area were randomly selected and their test scores tabulated. The 20 words with the highest number of incorrect responses were identified for use in the intervention programme.

Additionally, the YNRT by Meara and Buxton (1987) was adapted for use in the present study. Using the YNRT, a pretest was conducted prior to intervention and a posttest was carried out immediately after the one-month intervention programme ended to test for recall. The delayed posttest was conducted two months post-intervention to test for retention (see Appendix B, C and D for the respective pre-, post- and delayed post-tests).

Collected data (scores) were analysed using the Statistical Package for the Social Sciences (SPSS) software (Version 22). Specifically, the SPSS software was utilised to calculate for central tendency or mean scores as well as for standard deviation values (variance of distribution in relation to the mean). The software was also employed to run t-tests.

The t-test is essentially a measure comparing two means, commonly used to lead to the acceptance or rejection of the null hypothesis according to a pre-determined significance level (Agresti & Finlay, 2008). A p-value that is smaller than a pre-determined threshold value (commonly .05) indicates that the observed effect is highly unlikely to have occurred by chance (Privitera, 2012) and according to Dane (2003), the p-value is a measure of probability that garnered results are also true for the whole population of interest. The p-value for the present study is specified at $p < .05$, a level of significance often employed in psychological and educational studies (Best, 1977).

PROCEDURES

The Experimental group received four lessons spread over a period of one month, with each lesson lasting around 30 minutes. The teacher in charge was trained in the adapted PWIM approach and lessons were conducted in a classroom of the school. The structure of the intervention programme was modified from Calhoun's (1999) original PWIM lesson structure and is as follows:

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Structure of the adapted PWIM

1. Teacher puts up the selected picture(s) for the lesson.
2. Teacher asks students to identify what they see in the picture (prompting students to induce target words). Students may use their mother tongue if they do not know the words in English but the teacher is to translate it into English immediately.
3. Label the picture parts identified. (Draw a line from the identified object or area, say the word, write the word, ask students to spell the word aloud and then pronounce it.)
4. Read and review the picture word chart aloud.
5. Ask students to read the words (using the lines on the chart if necessary).
6. Identify concepts (e.g., colours, parts of the body, etc.) to emphasise with the whole class.
7. Provide students with cards to build their own sets of words to take home.
8. Read and review the picture word chart (say the word, spell it, say it again).

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FIGURE 2. Lesson structure of the PWIM as adapted for the present study

In Calhoun's (1999) original model of instruction, a PWIM cycle lasts between two to six weeks. However, as adapted for this study, the adapted PWIM cycle spanned four weeks with 20 words taught, using one picture (Appendix F).

## FINDINGS

The ensuing sections report the results of the reliability analyses for the instrument as well as the results for the pre-, post- and delayed post-tests.

### RELIABILITY SCORE FOR VOCABULARY TEST

TABLE 1. T-test results for the reliability of the Yes/No Recognition Test: Vocabulary breadth knowledge

|  | *Sig.* |
|---|---|
| Yes/No Recognition Test (Vocabulary breadth) | .435 |

Table 1 shows the Sig. (*p*) value obtained to be more than .05 ($p > .05$) at $p = .435$, indicating statistically no significant differences between group means and thus denoting the test's reliability in terms of stability over time.

### LEVENE'S TEST

Levene's Test was conducted to test for homogeneity of variances where the null-hypothesis assumes no difference between the groups' variances. The results are tabled as follows:

TABLE 2. Levene's Test for homogeneity of variances

|  | *F* | *Sig.* |
|---|---|---|
| Pre-test | 1.190 | .284 |
| Post-test | .784 | .383 |
| Delayed post-test | .673 | .392 |

Table 2 shows the *F* value obtained for the pre-, post- and delayed posttest was 1.1190, .784 and .673 respectively. The Sig. (*p*) value obtained was .284, .383 and .392 respectively, resulting in more than .05 (*p* > .05), the null hypothesis of no difference between the groups' variances was accepted. Thus, indicating that the assumption of homogeneity of variances was met.

## VOCABULARY KNOWLEDGE RECALL

### RESEARCH QUESTION 1

**RQ1**  Is there a difference in the vocabulary knowledge recall between the Experimental group and the Control group?

To address the first research question (RQ1), an independent sample *t*-test was first conducted to address the differences between pre-test means of the Experimental group and Control group (Table 3).

TABLE 3. Descriptive statistics of mean scores between-groups comparisons

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Experimental | 30 | 7.31 | 1.493 |
| Control | 30 | 7.44 | 1.788 |

As shown in Table 3, the mean scores of the pre-test for both Experimental group and Control group did not differ significantly, thus denoting baseline similarity at 7.31 (*SD*=1.493) and 7.44 (*SD*=1.788) respectively. Additionally, an alpha level of .05 was employed to determine if there is a statistically significant difference between group pre-test means in determining baseline similarity of the Experimental and Control group. Table 4 shows the comparisons between groups for pre-test.

TABLE 4. Independent samples t-test: Statistical analysis of pre-test

| Equal Variances Assumed | *t* | *df* | *Sig.* | M diff | SE diff | Lower bound | Upper Bound |
|---|---|---|---|---|---|---|---|
|  |  |  | **95% Confidence intervalof the difference** | | | | |
| Pre-test | -.215 | 30 | .831 | -.125 | .582 | -1.314 | 1.064 |

The null hypothesis of no significant difference in vocabulary breadth at the pre-test level between groups is tested. Table 4 shows that the Sig. (*p*) value obtained was more than .05 (*p* > .05) at *p* = .831, indicating no statistically significant difference between group means at the pre-test level. This allows for the acceptance of the null hypothesis of no significant difference in vocabulary breadth between the Experimental group and the Control group at the pre-test level.

Research Question 1 (RQ1) is addressed in the detailed comparison of the post-test mean scores between the Experimental group and Control group (Table 3.5). For the post-test scores that measures the participants' vocabulary breadth recall, the recorded mean scores were 10.50 (*SD*=2.129) and 7.94 (*SD*=2.594) respectively.

TABLE 5. Detailed descriptive statistics of pre-test and post-test scores

| Test Difference | n | Experimental | | Control | |
|---|---|---|---|---|---|
| | | **M** | **SD** | **M** | **SD** |
| Post-test | 30 | 10.50 | 2.129 | 7.94 | 2.594 |

Data in Table 5 shows the post-test mean scores for the Experimental group (*n* = 30, *M* = 10.50, *SD* = 2.129) and the Control group (*n* = 30, *M* = 7.94, *SD* = 2.594). Results indicate that the Experimental group experienced higher vocabulary breadth recall than the Control group by a mean difference of 2.56. The results presented demonstrate the vocabulary breadth recall differences between the Experimental and the Control group, hence addressing RQ1 posed.

NULL-HYPOTHESIS 1

**$H_{01}$** There is no significant difference in the vocabulary knowledge recall between the Experimental group and the Control group.

Employing an alpha level of .05, an independent samples *t*-test was conducted to determine if there are statistically significant differences between group means. Table 6 shows the comparisons between groups for post-test.

TABLE 6. Independent samples t-test: Statistical analysis of post-test

| Equal Variances Assumed | *t* | *df* | *Sig.* | 95% Confidence interval of the difference | | | |
|---|---|---|---|---|---|---|---|
| | | | | M diff | SE diff | Lower bound | Upper Bound |
| Post-test | 3.054 | 30 | .005 | 2.563 | .839 | .849 | 4.276 |

To address the first null hypothesis ($H_{01}$), an independent samples *t*-test evaluated the difference between group means at the post-test level (recall) and tested the null hypothesis of no significant difference between group means at the post-test level. As indicated in Table 6, the Sig. (*p*) value obtained was less than .05 (*p* > .05) at *p* = .005, indicating statistically significant difference between group means at the post-test level (recall). Therefore, this allows for the rejection of the null hypothesis of no significant difference in the vocabulary breadth recall between group means, and the acceptance of the alternative hypothesis that there is a significant difference in the vocabulary breath recall between the Experimental group and the Control group.

VOCABULARY KNOWLEDGE RETENTION

RESEARCH QUESTION 2

**RQ2** Is there a difference in the vocabulary knowledge retention between the Experimental group and the Control group?

To address the second research question (RQ2), an independent sample *t*-test was conducted to address the differences between means (Table 7).

TABLE 7. Descriptive statistics of mean scores between-groups comparisons

| Group | n | Pre-test M | Pre-test SD | Post-test M | Post-test SD | Delayed post-test M | Delayed post-test SD |
|---|---|---|---|---|---|---|---|
| Experimental | 30 | 7.31 | 1.493 | 10.50 | 2.129 | 9.50 | 2.309 |
| Control | 30 | 7.44 | 1.788 | 7.94 | 2.594 | 7.81 | 2.401 |

As shown in Table 7, the mean scores of the pre-test for both Experimental and Control group did not differ significantly, thus denoting baseline similarity at 7.31 (*SD*=1.493) and 7.44 (*SD*=1.788) respectively. For the delayed post-test that measures the participants' vocabulary breadth retention, the recorded mean scores were 9.50 (*SD*=2.309) and 7.81 (*SD*=2.401) respectively. Detailed comparison of the delayed post-test mean scores are presented as follows:

TABLE 8. Detailed descriptive statistics of delayed post-test scores

| Test Difference | n | Experimental M | Experimental SD | Control M | Control SD |
|---|---|---|---|---|---|
| Delayed post-test | 30 | 9.50 | 2.309 | 7.81 | 2.401 |

Data in Table 8 shows the delayed post-test mean scores for the Experimental group (*n* = 30, *M* = 9.50, *SD* = 2.309) and the Control group (*n* = 30, *M* = 7.81, *SD* = 2.401). Results indicate that the Experimental group experienced higher vocabulary breadth retention than the Control group by a mean difference of 1.29. The results presented demonstrate the vocabulary breadth retention differences between the Experimental and the Control group, hence addressing RQ2 posed.

NULL-HYPOTHESIS 2

**H$_{02}$** There is no significant difference in the vocabulary knowledge retention between the Experimental group and the Control group.

Employing an alpha level of .05, an independent samples *t*-test was conducted to determine if there are statistically significant differences between group means. As reported earlier (Table 4), no statistically significant difference between group means at pre-test level was recorded, denoting baseline similarity. Table 9 shows the comparisons between groups for the delayed posttest.

TABLE 9. Independent samples t-test: Statistical analysis of delayed post-test

| Equal Variances Assumed | t | df | Sig. | M diff | SE diff | 95% Confidence interval of the difference Lower bound | 95% Confidence interval of the difference Upper Bound |
|---|---|---|---|---|---|---|---|
| Delayed post-test | 2.826 | 30 | .005 | 1.688 | .833 | -.013 | 3.388 |

To address the second null hypothesis (H$_{02}$), an independent samples *t*-test evaluated the difference between group means at the delayed post-test level (retention) and tested the null hypothesis of no significant difference between group means at the delayed post-test level. As indicated in Table 9, the Sig. (*p*) value obtained was less than .05 (*p* > .05) at *p* = .005, indicating statistically significant difference between group means at the delayed post-test level (retention). Therefore, this allows for the rejection of the null hypothesis of no

significant difference in the vocabulary breadth retention between group means, and the acceptance of the alternative hypothesis that there is a significant difference in the vocabulary breath retention between the Experimental group and the Control group.


DISCUSSION

Hypotheses 1 and 2 predicted that pupils who experienced learning through pictures with words that leverage on their existing speaking and listening vocabulary would outperform their peers who learned via the conventional approach adopted in the Malaysian classrooms in vocabulary knowledge recall and retention. The findings of the interactive Yes-No vocabulary tests supported these hypotheses as pupils that formed the Experimental group achieved higher recall and retention of the vocabulary items taught as indicated in their post- and delayed post-test scores.

With regards to both hypotheses, vocabulary acquisition was consistently positive when pupils were exposed to text-picture combination via PWIM approach. The core of the PWIM capitalises on inductive thinking and concept attainment (Calhoun, 1999). Hence, the steps of the intervention are strategically designed and built not only to undertake the development of sight vocabulary directly, but also to classify the new vocabulary items through concept building. Continuously putting forth questions that stimulate classroom discussion as well as inciting pupils to 'throw out' words from existing listening and speaking vocabulary are significant activities of the model, and so is steering pupils towards learning to build concepts. Concept attainment, drawn from Bruner's (Bruner et al., 1956) work in the 1950s, still attracts the attention of researchers, including those from the sciences and social sciences. Take for instance, Kaur (2018) and Bhargava (2013) who incorporated concept attainment in their teaching models for the sciences and social sciences respectively and found them effective in enhancing learning.

Also, each cycle of the intervention is structured around a picture and the corresponding target words and activities are designed intentionally to maximize pupil engagement as well as create multiple encounters with target vocabulary. Teachers strive to afford pupils a vibrant and responsive learning environment where newly learned skills of conceptualising words acquired inductively are further expanded. The learning environment in the intervention framework is suitably aligned to Ramey and Ramey's (1998) Developmental Priming Mechanisms that advocate mentoring with exploration in learning on a recurring and predictable basis as a platform for positive cognitive and linguistic development in early childhood. Thus, the organization and interconnectedness of the activities are viewed as a major source of strength of the model. Recorded higher mean scores for both vocabulary knowledge recall and retention reiterate the effectiveness of this teaching model.

Furthermore, as the pupils explore and *work* the picture for items that they can identify with words, repetitions will not only add new words to the pupils' vocabulary knowledge but will also aid in enhancing recall and retention of these words. Each component of the intervention focuses on target vocabulary words and engages pupils with the target words multiple times. As claimed by Kucan (2012), instructional sequences that are structured to highlight target vocabulary will boost vocabulary development, especially if they continuously engage pupils. This design feature is grounded in research that proposes the expansion and processing of word meanings happening via numerous encounters (Beck et al., 2013; Beck & McKeown, 1991; Stahl, 1986).

The findings of this study are also consistent with other research hypotheses on picture plus words that strongly support Paivio's (1991) dual-code theory (e.g., Koć-

Januchta, Höffler, Thoma, Prechtl, & Leutner, 2017; Höffler, Koć-Januchta, & Leutner, 2017; Riding & Douglas, 1993). Paivio's (*ibid.*) dual-code hypothesis claims that pictures, when employed with words to elicit a verbal code and an image code, have a definite edge over single coded models in processing and storing of information. In the intervention, the pupils were prompted and encouraged to establish direct connections between images and the corresponding vocabulary and thereby gained access to two instead of just one retrieval avenue. The intervention in this study stresses on two interdependent types of memory codes, one verbal and the other, nonverbal.

The enhanced recall and retention of vocabulary knowledge of the pupils after experiencing exposure to the text-picture intervention is also highly likely due to the picture superiority effect, i.e., superior memory of pictures. This is consistent with previous research findings that have persistently acknowledged the superior memory of pictures that is applicable to both recall and recognition (Paivio, 1991; Madigan, 1983), with retention being enhanced distinctively by imaginal coding (Weldon & Roediger, 1987). A more recent study by Cuevas and Dawson in 2018 that investigated retention rate and visual/auditory conditions similarly claimed that incorporating dual-coding principles would reap superior benefit in learning. Findings of their study show exposure to visuals led to retention of twice as much information as those in auditory condition. However, there are also studies that have tested the boundaries of picture superiority in conceptual and perceptual processing (e.g., Jones, 2004; Vaidya & Gabrieli, 2000; Weldon & Coyote, 1996).

The interest expressed in the intervention is reflected in the number of studies carried out recently. Experimental studies and action research were conducted by Wahyuni (2016), Jiang (2014, 2015), Yurfalah (2014), Feng (2011), Li (2011), McDonald (2010) and Swartzendruber  (2007), among others, to investigate the effectiveness of the model on vocabulary acquisition and language learning as well as perceptions of both teachers and learners on the effectiveness of the method. The studies documented mainly positive findings that support the PWIM model as an effective vehicle in enhancing learners' vocabulary knowledge and language learning but there are also those with contrary results. A case in point is Jiang's (2014) research findings that showed no significant differences between the experimental and control group posttest means. Similarly, the results in Swartzendruber's (*ibid*.) quasi-experimental study indicated that statistically significant differences were not achieved between the groups. The negative findings could be influenced by the duration of each session and the number of sessions during the intervention. In Jiang's case, each intervention session lasted less than 10 minutes and subjects were also not highly homogeneous. As for Swartzendruber's study, intervention consisted of a total of 4 sessions only. Moreover, the subjects were a mixture of first and second language learners of various age groups. The experimental and control groups in her study had 14 and 21 subjects respectively. Comparatively, there is a total of 60 subjects in this study and also, each intervention session lasted considerably longer at 30 minutes per session. Hence, duration of intervention session as well as quantity of subjects could possibly be the contributing factors to the negative findings in the studies.

CONCLUSION

The key findings of this study offer significant insights on the effectiveness of implementing the adapted PWIM in a year 1 classroom for vocabulary knowledge recall and retention. The essentialist nature of the intervention signifies that pictures, when employed simultaneously with words to elicit words from the existing listening and speaking vocabulary of a child, is

an effective classroom tool for vocabulary instruction that resulted in effective recall and retention of these young learners' vocabulary knowledge size/breadth.

The structure and the steps of the intervention remain the inherent strength of the PWIM model. Not only does the model set out to induce inductive thinking among learners amid a dynamic and conducive learning environment, it further capitalises on learners' existing vocabulary knowledge to construct new corpus. Equally significant are concept building and attainment. When addressed, they contribute towards increasing level of processing for enhanced recall and retention of new vocabulary items learned. Previous studies lend support to the aforementioned via documented research findings though comparisons of findings did not result in a wholly consistent case. As mentioned earlier, the cause factors could possibly be differences in the duration and frequency of exposure to the intervention, as well as subject matters. Hence, these factors deserve due attention for a more efficient study.

Finally, caution is recommended as the findings may not be generalised based on the evidence of a small sample size that a substantially large sample could otherwise provide. However, this approach has been previously proven instrumental in effective language learning among learners of various calibre and age groups. Also, given PWIM's simple instrument in the form of any enlarged pictures deemed suitable by the teacher, it is an economically viable approach that can be applied even in the plains of the interior of a country; quite a rare trait in this era of technology advancement and monopolisation.

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# APPENDIX A

## PRELIMINARY WORD LIST TEST (SAMPLE)

**Pupil: _____**                    **Score: _____**

Tick (✓ ) for answers that you know and cross **(X)** for answers that you don't know.

| 1 | I | | 11 | help | | 21 | girl | |
|----|-------|---|----|---------|---|----|---------|---|
| 2 | look | | 12 | go | | 22 | her | |
| 3 | like | | 13 | are | | 23 | come | |
| 4 | on | | 14 | going | | 24 | the | |
| 5 | for | | 15 | away | | 25 | big | |
| 6 | cat | | 16 | a | | 26 | mother | |
| 7 | an | | 17 | get | | 27 | father | |
| 8 | been | | 18 | another | | 28 | said | |
| 9 | could | | 19 | boy | | 29 | as | |
| 10 | from | | 20 | did | | 30 | brother | |

Score: ___/30

# APPENDIX B

## VOCABULARY PRE-TEST (SAMPLE)

**Pupil: _____**                    **Score: _____**

Tick **(✓ )** for answers that you know and cross **(X)** for answers that you don't know.

| 1 | girl | | 11 | and | |
|----|-----------|---|----|-------|---|
| 2 | go | | 12 | dress | |
| 3 | play | | 13 | socks | |
| 4 | jump | | 14 | first | |
| 5 | sister | | 15 | last | |
| 6 | time | | 16 | face | |
| 7 | morning | | 17 | hair | |
| 8 | afternoon | | 18 | arms | |
| 9 | evening | | 19 | hand | |
| 10 | night | | 20 | mouth | |

# APPENDIX C

### VOCABULARY POST-TEST (SAMPLE)

**Pupil: _____**                    **Score: _____**

Tick (✓ ) for answers that you know and cross **(X)** for answers that you don't know.

| | | | | | |
|---|---|---|---|---|---|
| 1 | girl | | 11 | and | |
| 2 | go | | 12 | dress | |
| 3 | play | | 13 | socks | |
| 4 | jump | | 14 | first | |
| 5 | sister | | 15 | last | |
| 6 | time | | 16 | face | |
| 7 | morning | | 17 | hair | |
| 8 | afternoon | | 18 | arms | |
| 9 | evening | | 19 | hand | |
| 10 | night | | 20 | mouth | |

# APPENDIX D

### VOCABULARY DELAYED POST-TEST

**Pupil: _____**                    **Score: _____**

Tick (✓ ) for answers that you know and cross **(X)** for answers that you don't know.

| | | | | | |
|---|---|---|---|---|---|
| 1 | girl | | 11 | and | |
| 2 | go | | 12 | dress | |
| 3 | play | | 13 | socks | |
| 4 | jump | | 14 | first | |
| 5 | sister | | 15 | last | |
| 6 | time | | 16 | face | |
| 7 | morning | | 17 | hair | |
| 8 | afternoon | | 18 | arms | |
| 9 | evening | | 19 | hand | |
| 10 | night | | 20 | mouth | |

APPENDIX E

PICTURE A



APPENDIX F

SCHEDULE FOR CYCLE

| Cycle/Week | Words | | Picture |
|---|---|---|---|
| **Cycle**<br>Week 1 | 1. girl<br>2. play<br>3. go | 4. jump<br>5. sister | Picture A |
| Week 2 | 1. time<br>2. morning<br>3. afternoon | 4. evening<br>5. night | Picture A |
| Week 3 | 1. and<br>2. dress<br>3. socks | 4. first<br>5. last | Picture A |
| Week 4 | 1. face<br>2. hair<br>3. arms | 4. hand<br>5. mouth | Picture A |