The Influence of Instructional Method, Visual Spatial Intelligence, and School Readiness on Early Reading Abilities

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Authors' contributions

This work was carried out in collaboration between both authors. Author PPA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author MCH managed the analyses of the study. Both authors managed the literature searches, read and approved the final manuscript.

Article Information

Short Research Article

ABSTRACT

The objective of this research is to determine the effect of the instructional method of reading, visual spatial intelligence, and school readiness on early reading ability among the first grade of elementary students. This study adopted a treatment of 2 x 2 x 2 level design with the total sample of 80 students. There are two types of instructional method of reading; Multisensory and Phonics,these were used as treatment. Analysis of Variance of Three Factors was used analyse the data collection. The study reveals that, there are significant differences in the average scores of early reading-Performance of Multisensory and Phonics tests;differences between the highest and lowest visual spatial intelligences scores;the highest and lowest school readiness average scores as well as the significant interaction between instructional method of reading and visual

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spatial intelligences; instructional method of reading and school readiness; visual spatial intelligences and school readiness;the instructional method of reading, visual spatial intelligences, and school readiness on early reading. Based on these findings, it is, therefore, recommended to conduct technical guiandce activities for teachers in primary school,and conduct a workshop on writting the guidebook for the activity of multisensory methods in the classroom. In addition, designing early reading program as the foundation at the beginning of the school years recommended.

1. INTRODUCTION

One of the essential skills in primary school is the ability of reading. Good reading skills can help children in mastering the preferred field of study. When children learn to read in the early stages, they are expected to have the ability to understand the meaning of words or simple sentences.

Children are trained to read continuously without regard to the ability to understand the meaning or sentence, which tend to force the child to receive information beyond the limits of his ability [1]. Based on UNICEF Indonesia data, That's 270,000 children of primary school age (7-12 years) who should be in school are not. More than half (55%) of 15-year-old students are "low achievers" in reading [2].

Based on a study in 2013 conducted in Jakarta, 88% of children aged 6-7 years are able to recognize letters, but 58% still have difficulty reading the word, 47% still have trouble reading sentences fluently [3]. Based on a study conducted by the International Edition of the International Reading Literacy Study (PIRLS) International Association for the Evaluation of Educational Achievement (IEA) in 2016, Indonesian Primary School / MI students are ranked 60th out of 60 countries in terms of reading ability. Indonesia's position is still below Thailand and Morocco [4] .

Children 6-7 years old are in the concrete operational. At this stage the brain receives information and then processes it through concrete or real understanding.In the implications for learning, children need a real action such as seeing (Visual), listening (auditory), touching (kinesthetic), feeling (tactile) and even exploring an object using the five senses [5]. In fact 63.6% of children with reading disability in primary school is caused by visual difficulties with various types and shapes [6]. Parents ignore the factors of learning readiness so that children find it

challenging to control emotions and seem to have low attention as well as interest to read again. Parents compete in training their children to read earlier, by forcing children less than 6 years old to learn to read. This inhibits the children to read since they can not control their emotions, making it difficult to focus attention and become even less interested in reading [7].

This study aims to prove the following questions empirically: (1) the difference of early reading ability between multisensory and phonic instructional method; (2) the difference of early reading ability between those with high and low visual spatial intelligence; (3) the differences of early reading ability between those with high and low school readiness; (4) the interaction between instructional method of reading and spatial-visual intelligence; (5) the interaction between instructional method of reading and school readiness; (6) the interaction between visual spatial intelligence and school readiness; and (7) the interaction between instructional method of reading, visual spatial intelligence, and school readiness to early reading ability in children aged 6-7 years.

1.1 Early Reading for Children (6-7 Years Old)

Einon, states that early reading is a skill of connecting written words with sounds heard by a child. Reading is the process of translating the letters and groups of letters into sounds. There are two elements that need to be trained to improve reading skills [8]. First, the child must know that small variations in form can cause significant differences in sound and major changes in meaning, for example, the word "it" with "mother". Second, words are composed of sounds represented by a group of letters. There are several elements in reading skills that require practice, including: (1) understanding that writing on paper symbolizes words; (2) the words in the text are specific (a word is always written

in the same way); (3) words are placed in accorandce with specific rules of reading from left to right, and from top to bottom.

Early reading is about the process of outside-in and inside-out. Out-side-in processes are vocabulary knowledge, conceptual knowledge, story schemes and comprehension. The inside-out process is the interpretation of the writing into sound, and the sound becomes writing, including the awareness of the phoneme and connecting between letters with sound [9].

Harris and Siplay [10], divide the development of reading into five stages, namely: (1) the development of reading readiness; (2) the initial reading stage; (3) the development stage of reading or reading skill; (4) stage of expansion of reading ability; and (5) the stage of smoothing of reading ability.The readiness of reading can begin from 1-2 years old. In this stage, children begin to interest about book. The readiness of reading means that children are mentally prepared to learn reading. In general, readiness to learn reading is until the age of 6 years. The early reading ability of children begins at the age of 6-7 years or the primary school grade. The latest early reading stage is at the end of second grade in primary school.

Devit and Omrod [11], reveals that children (6-7 years old) are at the first stage that is the initial reading or early reading stage of deciphering codes. At this stage, the child focuses on the relation of letters to sounds and gains increased insights about the natural spelling. The child relies entirely on the written text. At this stage the child is able to hear his own phonemes in words, increase of ability to decipher the word, as well as to begin to grow observations of words in the vocabulary that can guide the child into a competent reader. The overview of the development of early reading includes: (1) focus on writing, meaning and knowledge of the story; (2) focus on the form of wording and sound matching with symbols; and (3) the coordination of knowledge between writing and stories. In the early reading phase, children can start by reading a simple story. The sequence of developmental characteristics of early reading at the age of 6-7 years or first grade on primary school are, namely: (1) children are able to read and retell the familiar story in general; (2) being able to use strategy (re-reading, predicting, asking, relationships between words) when detailing the notion of being able to use reading as the goal of self-initiative; (3) able to read orally

and fluently; (4) able to use a combination of words and sounds, parts of words, and relationships between words to recognize new words; (5) able to recognize a number of new words by itself; and (6) able to sound and representing all spellings of the word vigorously.

1.2 Visual Spatial Intelligence

The principles of multisensory and phonic methods are based on Howard Gardner's cognitive theory,stating that children learn in different styles and have learning modalities such as visual, auditory,tactile and kinesthetic. Children also absorb and recall information through the modalities. Children with developing spatial-visual intelligence require the phonic method to learn reading, that is, trough combining images with words while learning to read [12]. However. it will also be easier to use multisensory methods to clarify certain words such as making a scrapbook by making a scaled solar picture shoot for the word 'sun' or sticking a long, vertical rope to the word 'high'. Intelligence deals with the ability to solve problems and to create products and works in a rich context and natural state. Gardner provides a means to map human capabilities by grouping capabilities into eight comprehensive categories [13], including: (1) linguistics; (2) logical-mathematica; (3) visual spatial; (4) bodily-kinesthetic; (5) musical; (6) interpersonal; (7) intrapersonal, and (8) naturalist.

The indicator of reading ability in several cases of children with visual spatial intelligence in school is disabilities to know letters, especially if the school does not use art or visual methods as a variation of teaching. Some children will experience "dyslexia" or "learning disablity" due to difficulties in deciphering words. Children whose visual spatial intelligence develops perceive the same lettering as when children perceive images as visually appealing from the point of view in different spatial angles [14]. However this can not be applied to linguistic symbols, where the letter 'b' is different in meaning with'd'.Visual spatial intelligence is the ability to understand the visual world accurately (e.g as a scout) and makes changes to that perception (e.g as an architect or interior decorator) [15]. Visual spatial intelligence involves sensitivity to the colours, lines, shapes, spaces, and relationships that exist between these elements. This includes the ability to

visualize, represent graphics or visual ideas spatially, and orientate appropriately in a spatial matrix. Intelligence is optimized by the imagination of the inner eye. Indicator observation of the tendency of children to visual spatial intelligence, including: (1) children are able to report clear visual images; (2) children are able to read maps, graphs, and diagrams more easily than reading text; (3) children are daydreaming; (4) children love to do art activities; (5) children are able to draw well; (6) children love to see movies, slides, or other visual presentations; (7) children love to do puzzles, labyrinth, maze, or similar visual activities; (8) children are able to construct interesting three-dimensional constructions (beams, lego, etc.); (9) children get more pictures than words when reading; (10) children scribble on task books, worksheets, or other study materials.

1.3 School Readiness

One of contributing factors to the success of reading in addition to visual spatial intelligence is school readiness. School readiness refers to the stage of development necessary to learn efficiently. It is a characteristic and skill of a child who has previously shown positive academic and behavioral adjustments in school [16]. The primary focus in this discussion is social and emotional skills, self-regulation, including the ability to build relationships with teachers and peers, work together, and actively participate effectively in the classroom as well as to, inhibit negative reactions.

Roopnarine and Johnson [17], explaine that school readiness is driven by four interrelated social-emotional skills: (1) cooperative prosocial skills (social skills of helping friends and cooperative skills that support positive engagement within school learning activities); (2) emotional understanding and emotional regulation (the ability to recognize the emotional expression of others, recognize the emotional state of oneself, recognize moments that might provoke particular emotional reactions); (3) self-control (showing maturity, being able to control impulse to aggression, and learning according to demands through listening and attention); and (4) social problem-solving skills (verbal skills to recognize problems, make alternative solutions, and negotiate with peers, help with non-aggressive conflict management).

In order to figure out the right time that children are ready to go to school, it can be determined by several criteria, namely: (1) interest in learning, (2) enduring interests, and (3) progress. To ensure an accurate picture of the readiness of the child, these criteria should be applied, for example, the interest that arises to be taught and self-taught not by seeing and imitating others. If this general interest can survive for some time, it is a guideline for the child to be ready to learn despite the obstacles and difficulties. The persistence of interest arises not from the pressure of the adult but from within him/herself. The third criterion is progress. Through practising, children who are ready to learn will show progress even a little and gradually. If such an interest is last longer, the children are ready to learn despite the upcoming challanges and obstacles. Alternatively, it may be that children experience developmental obstacles that require particular intervention. The things that can be observed to find out the readiness of school children include: (1) ability to communicate the basic needs and thoughts of children; (2) the child's enthusiasm to learn; (3) following orders; (4) working together in class with peers and with teachers; (5) sensitivity to feelings toward other friends in the classroom; and (6) interest in writing reading [18]. Another relevant research is: (1) the exercise of awareness of phonology has a positive effect on the introduction of the letters of the alphabet, and the practice of comprehension has a positive effect on reading comprehension [19]; (2) genetic and environmental factors influence five kinds of pre-reading skills, including knowledge of writing, giving names quickly, phonological awareness, vocabulary, and verbal memories, responsible for reading and spelling. Genetic variables as covariate variables that also affect the ability to read in fourth grade [20]; (3) reading is an essential stage of development in first grade, if children learn to read well it will show progress in learning in the classroom. Reading achievements are determined by letters of knowledge, phoneme awareness, and outlining letters [21]; (4) adding multisensory activities to teach reading can affect the smooth reading of words in students of the first and second grade. Multisensory activities include touching fingers, carpet formation letters, and magnetic letters [22]; (5) groups of children who have difficulty reading difficulties in processing visual and spatial information [23]; and (6) the importance of readiness in first grade of primary school because it will affect the performance of children in school. The researchers compared two groups of children

who were given interventions from early school with those that only started in the middle of the semester [24].

1.4 Groundings Relating to Students' Early Reading Ability

The socio-cultural theoryis well-known as the grounding of early reading ability. Lev Semenovich Vygotsky is the one who proposed this theory. Vygotsky believes that the culture is supported by cultural tools [25]. Such tools serve as the media for developing high-level of mental processes, such as one's understanding and problem-solving attempts. Some of the cultural tools are namely languages, signs, and symbols. This resonates with Piaget's cognitive theory of early reading. In the age of 6 to 7 years, a child is in the pre-operational concrete cognitive stage [26]. The child is in a stage in which he or she is aware of symbols and is able to recognize all of the letters.

According to Vygotsky, children begin their learning when they are in the zone of proximal development or ZPD in short. ZPD refers to a list of tasks that might be difficult for children to afford but with the help other people, such as parents and their friends, children can learn these tasks. The assistance from other people is often called as scaffolding [27]. Scaffolding is provided with the intention to help the children to use private speech or inner speech and also their ability to communicate and to reflect on their self in solving a problem. This is in line with what Santoso has proposed that parents play a major role in educating, influencing, and directing their children towards positive experiences to shape their character [28]. In addition, this relates to the Chomsky's theory of language acquisition that there are several contributing factors of children's language, specifically their reading skill. Biological influence is among the factors. Chomsky argues that humans initiate to learn a language naturally and biologically at a specific time through a particular method. Other factors influencing language acquisition are behavior and environment. Behaviorists believe that language is acquired and learned through reinforcement and imitating.

1.5 The Interrelation of Learning Reading (Multi-sensory and Phonic) with Early Reading Ability

The multi-sensory and phonic method is originated from the cognitive theory of Howard Gardner. This theory proposes that children have a variety of learning styles with other types ofintelligence, such as visual, auditory, tactile, and kinesthetic. In addition, once the children learn something, they will recall the information in a way based on these types ofintelligence [29]. Children with visual-spatial intelligence prefer aphonic method to learn reading; this method is a combination of using pictures in addition to the words in the text during learning reading. On the other hand, using multi-sensory method is also easier to explain certain words, for example, by making a scrapbook and making a shining, sun-shaped handicrafts to describe the word 'sun' or putting a long rope vertically to explain the word 'high' [30].

In the scope of language learning, this is called as amulti-modality theory. This theory suggests that a number of materials and approaches are involved in language learning. For instance, one might use attractive visuals (such as pictures, colors, and letters that come in many shapes), gestures, interactions, as well as manipulable media [31].

Another theory underlying multi-sensory and phonic method is information process theory; it suggests that the children memorize and absorb information through stimulus from their sensory. This theory is mainly about an information processing model which perceives that the mechanism of human memory is the same as those in a computer. The process involves some systems, such as encoding, storing, obtaining, and retrieving the information when needed. All of these systems are directed by control processes which determine the mechanism and the time of the information through a system. Information processing is a term describing an approach to learning focusing on the function of memory [32].

Sensory memory or sensory register is the first component of a memory system. It functions to retrieve information from thesurrounding, such as sound, smell, and other resources through receptors. The retrieved information will be stored for around one to three seconds in the sensory memory.

There are two implications of the presence of sensory memory in a learning process. First, one is required to pay attention to the information that the person wants to recall; this process is also well-known as perception. Second, the person must be in a conscious state to receive

information. Furthermore, the first process occurs in a person's brain by giving the meaning towards the information received by the sensory memory. The perception accepted is based on the prior knowledge regarding a particular information [33]. During learning, Gagne [34] argues that giving attention is to be conducted firstly. There are several methods to enhance students' focus by presenting something unique during the class, such as using themulti-sensory method. Through giving the students a pleasure in learning will ease the process of storing the information in their memory.

According to Given, based on its functions, memory is classified into two, namely short-term and long-term memory. It is a system whose function is to store an amount of information for a short period of time. The information may be from sensory memory or long-term memory; an example of this process if a person sees a picture of a cockatoo. Furthermore, the information received by the sensory memory is sent to the short-term memory and, at the same time, the information stored in the long-term memory about the picture is unconsciously retrieved. As a result, the person will notice that the picture is a cockatoo.

Long-term memory refers to a part of thememory system of a person to store information for a longer period. Furthermore, the capacity of this type of memory can store an excessive amount of information. There are three parts of long-term memory, namely episodic memory, semantic memory, and procedural memory.

Episodic memory refers to a memory for storing personal experiences of a person that comprises of mental pictures regarding what the person sees and hears. The example of this memory is when a person reads the word 'watermelon' made from the rind of this fruit. Semantic memory is a memory that stores ideas or concepts relating to schemes. According to Piaget, scheme refers to a framework of a person's cognitive functioning to organize perception and experiences. Procedural memory refers to a memory storing procedural information that enables someone to recall methods or procedures of specific tasks [35]. The example of this memory is the way a person writes the number '8' on thesand. Human's memory will keep the information regarding this as procedural memory.

1.6 The Correlation of Visual-Spatial Intelligence with Early Reading Ability

Each individual possesses different characteristics, talents, and abilities making a person exclusive from one to another. The role of a person is not only as a human being but also spiritual and social being. This is in line with a notion that every person is not the same. Characteristics of diversity in people are reflected from aspects, e.g., sex, gender, talents, and intelligence. In regards to such a tenet, Woolfolk proposes that every child is different, this includes their performance, learning speed, and the learning method [36]. By that, the characteristics of children's visual-spatial intelligence, especially children aged 6 to 7 years or primary students, can be classified into two: a high and low visual-spatial intelligence [37].

1.7 The Correlation of School Readiness with Early Reading Ability

Theory of readiness grounds from the law of readiness by Thorndike. This concept is often called as stimulus-response theory [38]. It is believed that the basis of learning is the association between astimulus (S) and response (R). The stimulus will transfer an impression to human's senses,and the response will drive a person to do an action. This interrelation is called as aconnection which then is well-known as connectionism theory.

Thorndike further develops the research results into three laws, namely law of readiness, exercise, and effect [39]. Law of Readiness This law explains the readiness of a person in responding (to accept or to reject) a particular stimulant.

The law of exercise is divided into two, namely the law of use-a principle explaining that repeated practices will results in a stronger correlation of stimulus and response-and the law of disuse-a notion that stop practicing only leads to a weaker interrelation between the two variables.

The third law, the law of effect, proposes that the law of stimulus-response will be stronger if the results are satisfying. However, if the results aredifferent, such a correlation will not be that strong. This implies that an action with a good result is likely to repeat. Otherwise, one might decide not to do that action later on. This relates to rewarding and giving punishment.

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2. METHODS

This research was conductedat two primary schools; SDN Cakung Timur 05 Pagi and SDN Cibubur 09 Pagi, in Jakarta. This research used the experimental method. The researcher manipulated one or more independent variables, controlling for other variables that were relevant, and observed the effect of the manipulation on the dependent variable. The design of the experiment was treatment by level 2 x 2 x 2 (see Table 2.1). The research variables were: (1) dependent variable, early reading ability; (2) multisensory instructional method of reading (A1), and phonic instructional method of reading (A2); (3) high visual spatial intelligence (B1), and low visual spatial intelligence (B2); and (4) high school readiness (C1), and low school readiness (C2).

The target population in this study were all primary students in DKI Jakarta.The population involved all students enrolled in first grade in SDN Cakung Timur 05 Pagi and SDN Cibubur 09 Pagi Jakarta in 2016-2017 academic year which amounted to 144 students.The sample of research involved 60 students by using Multistage Stratified Random Sampling [40]. The researcher controlled internal and external validity during the treatment.

This study was conducted at SDN Cakung Timur 05 Pagi and SDN Cibubur 09 Pagi. The schools are reputable and well-known for their achievement. The research sites are considered as the regrouping of the two schools. This is to avoid high-achiever students that are mostly concentratedin favorite schools and low-achievers as in schools with low rank or less popular. Another consideration of selecting the sites is that the schools do not apply a written test in the selection process of grade 1 students. This study was conducted from July 2016 to January 2017.

Processes in selecting the sample were undergone in several stages. The first step was to determine the sample through cluster sampling. This is due to some considerations, such as (1) the ease to determine the location to have schools with the same level, (2) the distant location from one school to another is able to prevent a treatment from being contaminated, (3) both schools do not require students candidate to take a written test during the registration process, (4) both schools have been established for around 10 years, (5) the sample is in accorandce with the research subject which refers to children aged 6 to 7 years, (6) the sample also meets the requirement for the research subject that is the primary students at the grade I, (7) the sample represents the total population of grade I primary students in DKI Jakarta, (8) the teachers in the research sites are equal in terms of teaching skills, (9) the schools give the researcher a permit to conduct a research.

Table 2.1. Treatment by Level 2 x 2 x 2 designs

Instructional method of reading (A)	Visual Spatial (B)	School Readiness (C)	
		High (C_1)	Low (C_2)
Multisensory (A_1)	High (B_1)	$A_1B_1C_1$ Y_{111k} $k = 1, 2, ..., n_{111}$	$A_1B_1C_2$ Y_{112k} $k = 1, 2, ..., n_{112}$
	Low (B_2)	$A_1B_2C_1$ Y_{121k} $k = 1, 2, ..., n_{121}$	$A_1B_2C_2$ Y_{122k} $k = 1, 2, ..., n_{122}$
Phonic (A_2)	High (B_1)	$A_2B_1C_1$ Y_{211k} $k = 1, 2, ..., n_{211}$	$A_2B_1C_2$ Y_{212k} $k = 1, 2, ..., n_{212}$
	Low (B_2)	$A_2B_2C_1$ Y_{221k} $k = 1, 2, ..., n_{221}$	$A_2B_2C_2$ Y_{222k} $k = 1, 2, ..., n_{222}$

Once the area and the district have been decided, the schools and the level of the class were further selected by using Cluster Sampling. The homeroom teachers assist this process by conducting a prior selection to classify students with low and high visual-spatial intelligence. Preceding the step was to select the second sample by employing Simple Random Sampling to divide the students into experiment group and control group. This method refers to a randomized sampling selection in which all members of the sample possess an equal opportunity. In this process, the sample was selected by a lottery; each of the members of the sample writes his or her name on a paper. This results in a situation in which all of the subjects have the same chance to be in either experiment or control group.

Processes in selecting the sample are described as follows:

a. Determining experimental and control group by using the multi-sensory method and phonic method respectively. These were conducted by using simple random sampling. As a result, the grade I students in SDN Cakung Timur 05 Pagi were selected as the experimental group while those from SDN Cibubur 09 Pagi were the control group.
b. The students from the two schools took a visual-spatial intelligence test to identify those who are in the high and low level of this kind of intelligence. The test for both groups was conducted at the same time.
c. A test to measure the students' school readiness was conducted at the two schools. This is to identify the students who scored high and low as well as divided them into two groups based on the results of the test. The test for both groups was conducted at the same time.

This present study involved a total of eight meetings for the treatment. The time allocation of each meeting was 2 x @30 minutes or two hours of learning. Furthermore, the treatment was based on the lesson plan that has been designed. In terms of the learning, the experimental group employed themulti-sensory method,and the control group applied phonic learning.

The treatment was divided into three stages as follows:

2.1 Preparation Stage

The preparation was conducted by designing an appropriate lesson plan based on the curriculum. This lesson plan was designed for both experimental and control group which suited to the method applied to each group.

In addition, an instrument regarding students' early reading ability for both groups was constructed. An instrument of visual-spatial intelligence and the school readiness, which served as the attribute variable of this study, was also designed.

2.2 Planning

A briefing and discussion relating to the methods of teaching and learning reading used in experimental and control group, the multi-sensory and phonic method, were initially conducted in this process. During the briefing and discussion, it is essential to review the teachers' understanding regarding the teaching method as well as the implementation of the treatment.

Prior to the conduct of the treatment on both groups, a pre-test of the early reading ability was conducted to examine the initial conditions of the students Following this process was another assessment to distinguish the students with a high and low visual-spatial intelligence. On the third day, the students were assessed to identify their level of school readiness.

The students in the experimental and treatment group were engaged in a total of eight meetings based on the learning schedule in the schools as the treatment. This treatment was the implementation of the learning methods designed for both groups.

2.3 Final Treatment

During the final treatment, a post-test to measure the students' early reading ability in experimental and control group was held. This is to determine the outcome of themulti-sensory and phonic method applied.

The difference between the implementation of each method is provided in the Table 2.2.

Table 2.2. Treatment of the experimental group and control group

Experimental Group	Control Group
Implementing the Multi-sensory Method:	**Implementing the Phonic Method:**
1. Introduction (generating a situation) 15 minutes	**1. Introduction (generating a situation) 15 minutes**
➢ Teacher greets the students and starts the class by praying (5 minutes) ➢ Checking students' attenandce (5 minutes) ➢ Teacher introduces the students a topic that the class will discuss that is "My Hobby is Drawing" ➢ Teacherexplains the learning goals and things that the students can benefit from the learning. (5 minutes)	➢ Teacher greets the students and starts the class by praying (5 minutes) ➢ Checking students' attenandce (5 minutes) ➢ Teacher introduces the students a topic that the class will discuss that is "My Hobby is Drawing" ➢ Teacherexplains the learning goals and things that the students can benefit from the learning. (5 minutes)

2. Core Activities
1) Teacher tells the student about a rainbow
2) A Q&A session is held with the students relating to the story of a rainbow and its correlation with the topic "My Hobby is Drawing"
  • a. what are the colors of a rainbow?
  • b. who creates it?
  • c. what is a painter?
  • d. do you love to paint or draw something?
  • e. named the tools used for drawing!
3) Teacher writes on a whiteboard all the tools mentioned by the students.
4) Teacher asks the student to draw one of the drawing tools on a paper by using a crayon and makes a clay model of the drawing.
5) Teacher asks the students to read the tools that the students have been named
6) Teacher asks the students to read each letter in the writing
	2. Core Activities (30 minutes)
	1) Teacher sings an ABC song while showing the studentssome picture cards
	2) Teacher puts some pictures (e.g., crayon, colored pencils) and a sentence "My Hobby is Drawing" on the board
	3) Teacher asks one student to sound the initial letter of the things in the picture by singing ABC song
	4) Teacher asks the students to name every letter of the name of an object in the picture; the students will do this in the way they sing an ABC song
	5) Teacher asks the students to spell each letter of an object shown in the picture
	6) Teacher asks the students to read a word based on the object in the picture

3. Closing (15 minutes) ➢ Teacher reviews the lesson ➢ Teacher asks the students the alphabets that they have learned are	**3. Closing (15 minutes)** ➢ Teacher reviews the lesson ➢ Teacher asks the students the alphabets that they have learned are

The technique of collecting data employed the instrument in the form of a performance test, which has been developed and tested its validity and reliability. This research utilised data analysis descriptively and inferential (test of Anova 3 Factor), by firstly testing its normality and homogeneity.

The instrument of this research used a three-scale performance test; each score has its description, i.e., 1 = not able, 2 = able, and 3 = highly able. Guidelines of the test were designed based on the characteristics of children's visual-spatial intelligence. The data were collected from grade I students of SDN Cakung Timur 5 Pagi and SDN Cibubur 9 Pagi starting from October to December 2016.

A specific guideline is used in designing the instrument of this research. Validity and reliability tests were conducted once the instrument meets the requirement. The instrument was applied at class IA SDN Cakung Barat 15 Pagi on October 15th, 2016 with a total of 30 students as the respondents. Prior to the implementation, the instrument was assessed to an expert in pre-school education.

1) Validity Test

Validity tests used in this present study involved construct validity and empirical validity.

a. Construct Validity Test

Some lecturers and psychologists assessed the instrument of this research.

b. Empirical Validity Test

This test employed correlation coefficient product formula as follows:

$$r = \frac{N(\sum XY) - (\sum X)(\sum Y)}{\sqrt{\{N(\sum X^2) - (\sum X)^2\}\{N(\sum Y^2) - (\sum Y)^2\}}}$$

The score from each test was being correlated with the total score to test the validity of the instrument. The score from each test was being correlated with the total score to test the validity of the instrument. The test on 30 respondents shows that R_{count} = 0.434; in the significant level α = 0.05, the value of R_{table} = 0.361. Questions on the test are valid if $R_{count} > R_{table}$. The results of validity test on the instrument of early reading ability report that 12 out of 16 questions are valid. Questions number 6, 8, 12, and 14 are discarded.

2) Reliability Test

A reliability test was conducted once the validity test was completed. The reliability test for the Performance Test applied Alpha's reliability formula as follows:

$$r_{11} = \frac{(k)}{(k-1)}\left(1 - \frac{\sum \sigma_b^2}{\sigma^2_t}\right)$$

Description:

R_{11} = reliability of the instrument
K = total questions
$\Sigma\sigma_b^2$ = total of variants of the questions
σ_1^2 = total variants

In this test, the value of reliability coefficient is required to determine the stability and accuracy of the instrument. The results of the calculation of reliability coefficient show that r_{11} = 0.834. By that, it is concluded that the instrument used for assessing students' early reading ability has a high-reliability level.

3. RESULTS

Early reading ability of first-grade of primary school students in the group were given multisensory method and high visual spatial intelligence, and high school readiness; the result of the score are : maximum score of 28, minimum score of 20, range score of 8, average score of 23,70, median score of 28,5, mode of 22.5, and standard deviation of 2.54.Groups were given multisensory methods and had high visual spatial intelligence, as well as low school readiness, maximum score of 28, minimum score of 26, span of 2, average of 32.10, amedian of 31.5, mode of 35.79, and standard deviation of 4, 89.Groups were given multisensory methods and had low visual spatial intelligence, as well as high school readiness, the score for these groups are : maximum score of 37, minimum score of 24, score range of 13, average of 31.10, median of 31.5, mode of 31.5, and standard deviation of 4, 20.Groups were given multisensory methods and had low visual spatial intelligence, as well as low school readiness, The score distributions of these groups are a maximum score of 48, minimum score of 37, range of 11, average of 42.50, median of 42.50, mode of 38.75, and standard deviation of 3, 66.

Early reading ability of first-grade primary school students in groups were given phonic method and high visual spatial intelligence, as well as high school readiness, the score of these groups are maximum score 42, minimum score 30,the range of students' scores was 12, average 36,70, median 37, mode 37.5, and standard deviation 3.59. Groups were given phonic methods and had high visual spatial intelligence, as well as low school readiness, the score of these groups are: a maximum score of 28, a minimum score of 19, a range of 9, an average of 23.20, a median of

23, a 20.5 mode, and a standard deviation of 3.12. Groups were given phonic methods and have low visual spatial intelligence, as well as high school readiness, the score distribution are: a maximum score of 30, minimum score 25, span 5, average 27.20, median 26.83, 25.5 mode, and standard deviation 1, 93. Groups were given phonic methods and had low visual spatial intelligence, as well as low school readiness, the score for these groups are: a maximum score of 34, a minimum score of 25, a range of 9, an average of 29.10, a median of 29, a mode of 29.5, and a standard deviation of 2.92. (See Table 3.1).

Test requirements analysis (normality and homogeneity) utilised Lilliefors test and Bartlett test. The conclusion is that the data are from normally distributed populations (Table 3.2) and have homogeneous variance (Table 4.1).

The test was continued by hypothesis test using Anova 3 factor (Table 4.2). The source of group variance A shows that Fcount = 18.096> from

Ftable ($α = 0,05$) = 3,97, then H0 is rejected. Therefore there is a difference in early reading ability between groups of children who were treated with a method of multisensory with a group of children given the phonic method.

The source of group variance B shows that Fcount = 20.941> Ftable ($α = 0,05$) = 3,97, then H0 is rejected. In other words, there is a difference in early reading ability between groups of children who have high spatial visual intelligence with groups of children with low spatial visual intelligence.

The source of group variance C shows that Fcount = 6.983> Ftable ($α = 0,05$) = 3,97, meaning H0 is rejected. The conclusion is that there is a difference in early reading ability between groups of children who have high school readiness with groups of children who have low school readiness.Source of group variance AB, AC, and BC, shows Fcount> Ftable ($α = 0,05$), meaning H0 is rejected.

Table 3.1. Score of early reading ability

Factor A	Factor B	Stat	Factor C		Σ
			C1	C2	
A1	B1	N	10	10	20
		Mean	23,70	32,10	27,90
		Modus	22,50	35,79	29,15
		Median	28,55	31,50	30,03
		Std Dev.	2,54	4,89	3,72
		Min.	20	26	23
		Max.	28	38	33
	B2	N	10	10	20
		Mean	31.10	42,50	36,80
		Modus	31,50	38,75	35,13
		Median	31,50	42,50	37
		Std Dev.	4,20	3,66	3,93
		Min.	24	37	30,50
		Max.	37	48	42,50
A2	B1	N	10	10	20
		Mean	36,70	23,20	29,95
		Modus	37,50	20,50	29
		Median	37,00	23,00	30
		Std Dev.	3,59	9,73	6,66
		Min.	30	19	24,50
		Max.	42	28	35
	B2	N	10	10	20
		Mean	27,20	29,10	28,15
		Modus	25,50	29,50	27,50
		Median	26,83	29,00	27,92
		Std Dev.	1,93	2,92	2,43
		Min.	25	25	25
		Max.	30	34	32

The respective conclusions are (1) there is an interaction between instructional method of readings and spatial visual intelligence; (2) there is an interaction between instructional method of readings and school readiness; and (3) there is an interaction between spatial visual intelligence and school readiness to early reading ability of children aged 6-7 years.

The source of ABC group variance shows that Fcount = 15.969> Ftable (α = 0,05) = 3.97, which means that H0 is rejected. The conclusion is that there is an interaction between the instructional method of readings, spatial visual intelligence, and school readiness to the early reading ability of children 6-7 years.

Table 3.2. Normality Test of data

Group	N	L	L_{table}	Conclusion
A_1	40	0,118	0,140	Normal
A_2	40	0,134	0,140	Normal
B_1	40	0,137	0,140	Normal
B_2	40	0,131	0,140	Normal
C_1	40	0,113	0,140	Normal
C_2	40	0,131	0,140	Normal
$A_1B_1C_1$	10	1,148	0,280	Normal
$A_1B_1C_2$	10	0.152	0,280	Normal
$A_1B_2C_1$	10	0,080	0,280	Normal
$A_1B_2C_2$	10	0,131	0,280	Normal
$A_2B_1C_1$	10	0,077	0,280	Normal
$A_2B_1C_2$	10	0,160	0,280	Normal
$A_2B_2C_1$	10	0,173	0,280	Normal
$A_1B_2C_2$	10	0,147	0,280	Normal

4. DISCUSSION

4.1 Hypothesis 1

The hypothesis proposes that there is a difference in theearly reading ability of children aged 6 to 7 years after implementing themulti-sensory and phonic method.

This is in line with the theory of psycholinguistics which proposes two learning models to help a child learn reading. One of the models is abottom-up process in which the child looks up individual components of reading, such as recognizing letters, identifying thecorrelation of sounds, and forming up all sounds to obtain a meaning. The example of language learning is the use of thephonic method. Another model is atop-down process with several elements, such as learning targets, background knowledge, and determining expectations regarding the information that the children will select from the

reading. In this case, children learn reading through their experience. An example describing this notion is the use of whole-language approach through multi-sensory method.In this case, the reading activity is not only limited to pronouncing the letters but also referring the meaning from the children's memory (this includes all words based on the visual to retrieve the information) [41].

The underlying theory of multi-sensory and phonic method is the cognitive theory of Howard Gardner. This theory proposes that children have a variety of learning styles with types ofintelligence, such as visual, auditory, tactile, and kinesthetic. In addition, once the children learn something, they will recall the information in a way based on the types ofintelligence [42]. In the area of language learning, this is called as multi-modality theory. This theory suggests that a number of materials and approaches are involved in language learning. For instance, one might use attractive visuals (such as pictures, colors, and letters that come in many shapes), gestures, interactions, as well as manipulable media [43].

Another theory underlying multi-sensory and phonic method is information process theory; it suggests that the children memorize and absorb information through stimulus from their sensory. Sensory memory or sensory register is the first component of a memory system. It functions to retrieve information from thesurrounding, such as sound, smell, and other resources through receptors. The retrieved information will be stored for around one to three seconds in the sensory memory.

There are two implications of the presence of sensory memory in a learning process. First, one is required to pay attention to the information that the person wants to recall; this process is also well-known as perception. Second, the person must be in a conscious state to receive information. Furthermore, the first process occurs in a person's brain by giving the meaning towards the information received by the sensory memory. The perception accepted is based on the prior knowledge regarding a particular information. During learning, Gagne argues that giving attention is to be conducted firstly. Several methods can be attempted to get the students' attention by presenting something unique during the class, such as using the multi-sensory method. A pleasant learning experience will ease the process of storing the information in their memory [44].

Table 4.1. Homogeneity test of data

Group	Result		Conclusion
A_1 and A_2	$\chi^2_{count} = 3,568$	$\chi^2_{table} = 3,84$	Homogene
B_1 and B_2	$\chi^2_{count} = 0,002$	$\chi^2_{table} = 3,84$	Homogene
C_1 and C_2	$\chi^2_{count} = 2,981$	$\chi^2_{table} = 3,84$	Homogene
$A_1B_1C_1$, $A_1B_1C_2$, $A_1B_2C_1$, $A_1B_2C_2$, $A_2B_1C_1$, $A_2B_1C_2$, $A_2B_2C_1$, and $A_2B_2C_2$	$\chi^2 = 9,941$	$\chi^2_{table} = 14,067$	Homogene

Table 4.2. Test of Anova 3 Factor

Variances	Dk	JK	RJK	F	F_{table}
A	1	217,800	217,800	18,096	3,97
B	1	252,050	252,050	20,941	3,97
C	1	84,050	84,050	6,983	3,97
AB	1	572,450	572,450	47,561	3,97
AC	1	1232,450	1232,450	102,396	3,97
BC	1	423,200	423,200	35,161	3,97
ABC	1	192,200	192,200	15,969	3,97
D	72	866,600	12,036		
Sum	79	3840,800			

This echoes the theory of cognitive by Piaget that children age 2 to 7 years, or in pre-operational stage, experiences of time and dimension are inseparable - all of these are centered on the parts of children's body, e.g., buccal (cheeks), tactile (touch), visual (eyes), listening (ears), postural (all parts of body), and duration needed to reach an object. By that, implementing multi-sensory method is appropriate for the cognitive development of children age 6 to 7 years [45].

This is echoing the results seen in Wang et al. The research by Wang et al. implemented phonic method to enhance the awareness regarding phoneme and phonic capability. Fluency in reading can be maintained in the first year of studying in a primary school and be gradually improved when a student continues to a higher level of study - this, however, is possible through practice [46].

This notion is also in line with other research by Campbell, Helf, and Cooke. From the research, it is implied that implementing multi-sensory activities in teaching reading is able to improve the aspect of fluency of grade I and II students, particularly in the alphabetic stage. These activities include fingering, arranging a stray of words, and using magnetic alphabet toys [47].

This situation also occurs during the treatment process in experimental and control group. It is revealed that implementing multi-sensory method is effective for students who unable to read or those with delayed reading skills. About 50% of the students have above average early reading skill, and 17.5% of the students are at the average level. Activities in the method are not limited to seeing and pronouncing, students also engage in other tasks, such as touching and manipulating alphabets that are being read. On the other hand, phonic method is aimed at students who already recognized some alphabets - they only need to enhance their fluency. About 30% of the students have above average early reading skill, and 42.5% of the students are at the average level.

4.2 Hypothesis 2

This hypothesis argues that students in a high-level group of visual-spatial intelligence have better reading ability than those in the low-level group.

Therefore, the results of hypothesis testing to determine that the visual-spatial intelligence of the 6 to 7 year age students affect their early reading ability is acceptable. This condition does not only occur in children with reading problems, such as dyslexia, low-vision, and learning disabilities [48]. Not all children age 6 to 7 years are aware of and recognize a smaller variation of the shape of alphabets that result in a different sound and meaning [49], an example of this is the word 'mother'. Moreover, words are formed from a set of sounds symbolized by a set of alphabets. There are several elements in reading skill that require practice: first, understanding that

writing is the symbolization of words. Second, the words are specific, or, in other words, it is written in the same way. Third, words are arranged based on specific rules of reading, either starting from left to right and from upper to lower side.

Visual-spatial intelligence is among the contributing factors of reading skill. There are two elements previously discussed that one must improve the reading ability through practices. First, children are urged to be aware of and recognize a smaller variation of the shape of alphabets that result in a different sound and meaning - for example, the word 'mother'. Second, words are formed from a set of sounds symbolized by a set of alphabets. There are several elements in reading skill that require practice: first, understanding that writing is the symbolization of words. Second, the words are specific, or, in other words, it is written in the same way. Third, words are arranged based on specific rules of reading, either starting from left to right and from upper to lower side.

Early reading is in the initial process of reading - the visual process. Reading as a visual process is a mean of translating written symbols into sounds. Children recognize the symbol of sounds through visualization. Vygotsky often names the term visualization as mental imagery. This term is defined as a reconstruction of an image of an object that Gardner believes as among the abilities in visual-spatial intelligence [50]. The visual image is based on what a person sees. In reading, there are three basic components, namely recording, decoding, and encoding. Recording refers to the process of associating words and sentences with its sounds based on the writing system used. In addition, a process of decoding is an attempt of translating a set of graphics into words. Both recording and decoding often occur during the early years of studying in a primary school, in grade I and II. This is well-known as early reading. The focus of this stage of reading is a perceptual process - a process of introducing correspondence of a set of alphabets with the language sounds.

A study by Nevo and Bar-Kochva argues that visual-spatial intelligence is a skill to visualize an image in one's mind. When reading, children associate the sounds and its combination. Through this process, the writing read by the children becomes a set of sounds in a combination of word, word group, and sentence; these possess its meaning [51].

In Lioe Tjoe's study, it is revealed that early reading is closely related to visual reading or mental imagery [52]. From the perspective of biology, the process involves the children's visual and auditory intelligence. The visual intelligence relating to reading refers to understanding directions, identifying similarities and differences, recognizing colors, shapes, and words, seeing ability, as well as possessing a sense of figure-ground perception. Therefore, the students in the high-level group of visual-spatial intelligence have better reading ability than those in the low-level group.

A research by Wright, Conlon, and Dyck infers that the aspect of visual and spatial associates with reading skills. Children with reading disability or dyslexia are slow to respond visual stimulus relating to visual and spatial aspects which obstructs them to read symbols given in the test. The experimental class mostly comprises of children with reading problems and the other group is the opposite by which creates a significant gap. Such a situation blames the difficulties of processing visual and spatial information [53].

4.3 Hypothesis 3

The early reading ability of the children age 6 to 7 years with a high-level of school readiness is better than those with low-level.

Early reading ability is a skill that can be taught to children. Santrock emphasizes an importance of an individual to have an opportunity to access education once this person is ready. Delay in such a process leads to a condition in which the person is unable to conceptualize their ability at maximum. It should be noted that the children are unable to learn if they are not ready to do so regardless a number of learning efforts attempted [54].

Vygotsky's socio-cultural theory is the concept underlying the interrelation of school readiness and reading ability [55]. Vygotsky suggests that the school readiness relates to asocial and emotional aspect. Emotion is also related to the way a person controls his or her emotion during reading. This will hold the children's temper if there are some difficulties during reading. Emotional control is able to promote children's independent as well as their mastery of thesocial environment to prepare the children to study in an academic atmosphere.

A study by Piotwrska suggests that the readiness influences one's social-emotion aspect and self-adaptability in terms of reading [56]. Students with emotional and social maturity or those who are able to control their emotion, are easy to focus on the texts in terms of visual that enables the students to improve and understand the text.

This is also in line with the finding in the present study in terms of the cognitive aspect relating to the students' reading ability. Most of the students score 3 on each number. The scores of the aspect of social and emotional are varied, e.g., 2 and 3; some students who skip motoric activities only score 1.

4.4 Hypothesis 4

Multi-sensory method refers to the way a person elaborates, givesexamples and assigns the students to involve more than one of their senses to read fluently. The teacher assigns the students in a set of learning activities that involve hand movement, visual, auditory, and smelling sense, using materials from several words pronounced by the students, as well as syncing the learning activities with the relevant learning targets.

On the other hand, thephonic method incorporates elaborating, giving examples, as well as assigning students a task to read fluently through listening to the sounds of thealphabet. Students also synthesize the alphabets into syllables and words. Furthermore, these words are associated with the first letter of several objects that the students recognize, such as letter A with the word '*Ayam*' (chicken), as well as B with a picture of Ball.

The multi-sensory and phonic method is originated from the cognitive theory of Howard Gardner. This theory proposes that children have a variety of learning styles with intelligence, such as visual, auditory, tactile, and kinesthetic. In addition, once the children learn something, they will recall the information in a way based on this intelligence. This is in line with the information process theory; it suggests that the children memorize and absorb information through stimulus from their sensory.

Early reading is in the initial process of reading - the visual process. Reading as a visual process is a mean of translating written symbols into sounds. Children recognize the symbol of sounds through visualization. Vygotsky often names the term visualization as mental imagery. This term is defined as a reconstruction of an image of an object that Gardner believes as among the abilities in visual-spatial intelligence. The visual image is based on what a person sees. Multiple intelligence theory implies that children categorized in visual-spatial intelligence category mostly depend on their visual in learning. By that, the children with this intelligence find it easy to implement thephonic method. This method often uses visual and auditory modalities during thereading process [57].

The finding reports that children with low visual-spatial intelligence have no issue regarding the perception of position and shape of letters with different sounds. Furthermore, these children are able to learn all the reading components in several modalities, such as visual, auditory, tactile, and kinesthetic.

According to the theory of cognitive by Piaget, children whose age ranges from 2 to 7 years, or in pre-operational stage, the experiences of time and dimension are inseparable - all of these are centered on the parts of children's body, e.g., buccal (cheeks), tactile (touch), visual (eyes), listening (ears), postural (all parts of body), and duration needed to reach an object.

In addition, Piaget asserts that forming the spatial information is the results of the topological relation in children's mind which leads to an image. This topological relation comprises of homeomorph which refers to the ability of children in recognizing differences between objects in a simple shape (e.g., cross, semi-circle, and box) as well as objects that are recognized through touching (haptic). In addition, there is a process of the formation of Euclides invariant in the form of perceptual appraisal on a particular object, understanding regarding the change on this object, and the use of thevertical-horizontal coordinate system to measure the distance between a person to the object [58].

The differences of modality in learning lead to a variety of the way the children receive information. Based on the theory of learning by Woolfolk, in psychological education, each learner has their own learning style by which the method proposed by the teacher must be in accorandce with the need of all learners. This is to help the learner receives information and achieves the learning target [59].

Gardner suggests that children with high-level of visual-spatial intelligence learn through visual

media. Another learning method related to visual and auditory is aphonic method. Children with low-level of visual-spatial intelligence learn with various modalities that allow them to involve some senses (visual, auditory, kinesthetic, and tactile) from their learning experiences [60].

A study by Mwoma implies that the needs of the students, as well as the variety of students' ability, are to be taken into account in teaching reading [61]. For that reason, teacher's understanding regarding the children's development can serve as a guideline in preparing a relevant and better learning material. Observing and gaining information during learning are the methods to design the guideline. The teacher will design the lesson plan by implementing learning reading method or providing the lesson that matches the needs of learners to achieve the learning goals.

In conclusion, the influence of variable A depends on variable B which implies that the interaction of the multi-sensory method in teaching reading also depends on the influence of visual-spatial intelligence on the students' early reading ability.

4.5 Hypothesis 5

Learning method and school readiness influence the early reading ability primary students at grade I.

The theory of behaviorism by Thorndike argues that school readiness is among the laws of learning other than exercise and effect. It also correlates with students' nervous system involved in learning; this also covers several aspects, e.g., cognitive, socio-emotional, language, and, most importantly, children's physical and motor aspect. The more the children prepare to learn, the easier the interaction between stimulant and response be formed [62].

For the above reasons, it is important to prepare the children prior to studying a new lesson. During the preparation, it is important to consider the needs of the children as well as their development stage; this involves multi-sensory and phonics in learning theearly-reading ability. According to the theory of cultural diversity by Woolfolk, children with ahigh level of school readiness have a higher motivation in learning as well as possess varied learning modes. Therefore, these students require a different

method rather than involving visual and auditory activities, synthesizing the alphabets into syllables and words, associating these words with the first letter of several objects that the students recognize. This suggests that multi-sensory method is appropriate for students with high-level of school readiness [63].

According to the finding of this present study, learning independence is the aspect that constraints the children with ahigher level of school readiness. This implies that the children need support and guiandce from either their teacher or parents. Some children find it difficult during the implementation of themulti-sensory method since the method is originated from their learning experience through whole language approach. On the other hand, the children find no issue in the implementation of phonic method - a method focusing on alphabets.

Vygotsky's socio-cultural theory is the concept underlying the interrelation of school readiness and reading ability. This concept suggests that the school readiness relates to asocial and emotional aspect. Emotion is also related to the way a person controls his or her emotion during reading. This will hold the children's temper if there are some difficulties during reading. Emotional control is able to promote children's independent as well as their mastery of thesocial environment to prepare the children to study in an academic atmosphere. The aspect of school readiness focuses on several elements, such as social and emotional skill, self-control - including forming a relationship with friends and teachers, cooperating, actively participating in the class, as well as preventing negative reactions. Cognitive aspects, e.g., reading, writing, and accounting are not the only aspects involved.

A number of criteria, e.g., learning motivation, sustained interest, and improvement might assist one in determining the suitable period for children to go to school. These criteria must be considered to determine the children readiness accurately. For example, children must raise their interest to learn by not imitating other people. Able to maintain the learning motivation for a longer period suggests that the children are able to learn regardless any possible constraints. In addition, the children are able to sustain their motivation, not because of their parents ask them. The third criterion is improvement. Children who are ready to learn will show their improvement even the slightest one through practicing.

Cooke, Kretlow, and Helf suggest the significance of learning reading for primary students at grade I since it affects their performance in school. They compared two groups of children: one with treatment from the beginning of the academic year and the other with treatment starting in the middle of the academic year. It is revealed that the first group has a better learning readiness that leads to a better reading ability. As a result, the learning performance of these children is driven. This contrasts to those in the second group whereas the treatment is started in the middle of the semester; the children in this group have lower learning performance than the first group [64].

In conclusion, the influence of variable A depends on variable C which implies that the interaction of the multi-sensory method in teaching reading also depends on the influence of school readiness on the students' early reading ability.

4.6 Hypothesis 6

Visual-spatial intelligence and school readiness influence the early reading ability primary students at grade I.

Early reading is classified as the initial process of reading - the visual process. Reading as a visual process is a mean of translating written symbols into sounds. Children recognize the symbol of sounds through visualization. According to Vygotsky, the term visualization is well-known as mental imagery. Mental imagery is defined as a reconstruction of an image of an object that Gardner believes as among the abilities in visual-spatial intelligence. This implies that visual-spatial intelligence links with cognitive development since these elements are in the same neurological coverage related to children's thinking ability [65].

School readiness covers all aspect of readiness of a child, e.g., cognitive, socio-emotional, language, physical, and motor. These represent the adaptability and positive behavior at school. The correlation of school readiness with early reading ability lies on cognitive aspect [66] related to thetopological mechanism that has been practiced when children learn objects that come in various shapes and sizes. The concept of topology is based on several concepts, such as (1) proximity - a concept of the correlation between children on an object that considers some factors, e.g., position (inside-outside, up-

down, front-back), direction (come closer-move away, around-across, move forward-backward), separation - an idea that an object consists of part and as a whole, or separated and as a unity, (3) order - that refers to the notion of before-after and beginning-end, and (4) enclosure - that is defined as the position of an object which is bounded by point or line with things surrounding the object in all sides . This concept is beneficial for reading. People read a book from right to left and from upper side to lower side. Furthermore, different shapes of a letter lead to different sounds.

Vygotsky believes that school readiness affects children's behavior in reading, the way the children open a page of a book, as well as the way the children read (from left to right or upper side to lower side). According to Gardner's multiple intelligences, children with visual-spatial intelligence are more likely to have problems with their perception regarding how they receive the image of alphabets. These children are confused to read because they see a series of alphabets in a different way. The issue constrained the children with alow level of school readiness is to focus their emotion if they have reading problems [67].

A research by Wright, Conlon, and Dyck argues that this condition is the result of difficulties of processing visual and spatial information [68]. Furthermore, Cooke, Kretlow, and Helf suggest the significance of learning reading for primary students at grade I since it affects their performance in school. Visual-spatial intelligence is closely related to cognitive aspect of children's school readiness [68].

In conclusion, the influence of variable B depends on variable C which implies that the interaction of the multi-sensory method in teaching reading also depends on the influence of school readiness on the students' early reading ability.

4.7 Hypothesis 7

There is an interaction between learning method and visual-spatial intelligence with the early reading ability primary students at grade I.

Woolfolk explains that every child is different, this includes their performance, learning speed, and the learning method [69]. Different learning modalities lead to a variety of the way the children receive information. The theory of

learning by Slavin suggests that each learner has different learning style by which the method proposed by the teacher must be in line with the learners' needs. This is to help the learner receives information and achieves the learning target [70]. In the area of language learning, this is called as multi-modality theory. This theory suggests that a number of materials and approaches are involved in language learning. For instance, one might use attractive visuals (such as pictures, colors, and letters that come in many shapes), gestures, interactions, as well as manipulable media.

Early reading is classified as the initial process of reading - the visual process. Reading as a visual process is a mean of translating written symbols into sounds. Children recognize the symbol of sounds through visualization. According to Vygotsky, the term visualization is well-known as mental imagery. Mental imagery is defined as a reconstruction of an image of an object that Gardner believes as among the abilities in visual-spatial intelligence. This implies that visual-spatial intelligence links with cognitive development since these elements are in the same neurological coverage related to children's thinking ability [71].

A study by Yangin implies that the needs of the students, as well as the variety of students' ability, should be the foremost concern in teaching reading for students in the beginner level. For that reason, teacher's understanding regarding the children's development can serve as a guideline in preparing a relevant and better learning material. Observing and gaining information during learning are the methods to design the guideline. The teacher will design the lesson plan by implementing learning reading method or providing the lesson that matches the needs of learners to achieve the learning goals [72].

Vygotsky's socio-cultural theory is the concept underlying the interrelation of school readiness and reading ability. This concept suggests that the school readiness relates to asocial and emotional aspect. Emotion is also related to the way a person controls his or her emotion during reading. Thisis able to hold the children's temper if there are some difficulties during reading. Emotional control is able to promote children's independent as well as their mastery on the social environment to prepare the children to study in an academic atmosphere [73].
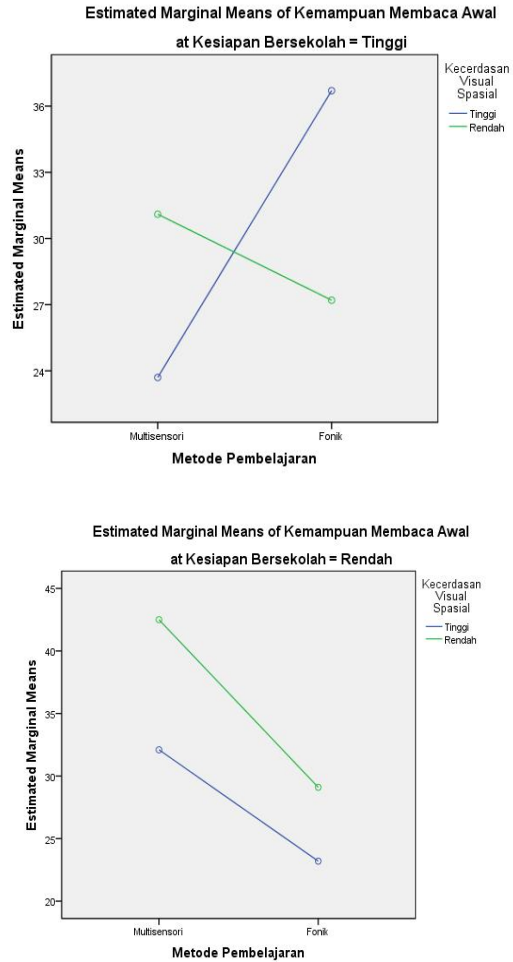

Fig. 1. Interaction between learning methods, visual spatial intelligence, and school readiness to the early reading ability of children

Jung's research also resonates to the results seen in Piotwrska that the readiness affects one's social-emotion aspect and self-adaptability in terms of reading. Students with emotional and social maturity or those who are able to control their emotion, are easy to focus on the texts in terms of visual that enables the students to improve and understand the text [74].

In conclusion, the influence of variable A depends on variable B and variable C which implies that the interaction of the multi-sensory method in teaching reading also depends on the influence of visual-spatial intelligence as well as school readiness on the students' early reading ability.

5. CONCLUSION

Based on the results of hypothesis testing and discussion of the research, it can be concluded:that (1) there is a difference of early reading ability between groups of children 6-7 years old who were given the method of multisensory with groups of children aged 6-7 years given the method of phonic; (2) there is a difference in early reading ability between groups of children 6-7 years old who have high visual spatial intelligence with groups of children 6-7 years old who have low visual spatial intelligence; (3) there is a difference in early reading ability between groups of children 6-7 years old who have high school readiness with groups of children 6-7 years old who have low school readiness; (4) there is an interaction between instructional method of reading and visual spatial intelligence on early reading ability of children 6-7 years old; (5) there is an interaction between instructional method of reading and school readiness to early reading ability of children 6-7 years old; (6) there is an interaction between visual spatial intelligence and school readiness to early reading ability of children 6-7 years old; (7) there is an interaction between instructional method of reading, visual spatial intelligence, and school readiness to early reading ability of children 6-7 years old.

This research have some implication, there are:

1. **Teacher Training in Universities:** The results report that the implementation of the multi-sensory method is better than the phonic method in the early reading ability of children aged 6 to 7 years. This implies that multi-sensory method is more suitable to implement to the children in that ages. Therefore, this research suggests that workshops about the application of themulti-sensory method for primary teachers or new teachers are necessary. The conduct of the workshops should be at the beginning of an academic year. In addition, designing a handbook of the activities involved during the implementation of the multi-sensory method is also essential.
2. **Department of Education:** Department of education is required to examine and investigate the development of teaching early reading by implementing themulti-sensory method. In this phase, a model of learning activities will also be developed. It covers the lesson plan and the media (related to audio, visual, tactile, and kinesthetic aspect) that will be used throughout the class.
3. **Grade 1 Primary Teacher:** The results show that the early reading ability of the children age 6 to 7 years with a high-level of school readiness is better than those with low-level. This implies that foundation program conducted once the student starts their class in a primary school is necessary. Moreover, a program to strengthen students' reading is also recommended. This program will be conducted for about two to three months for students who already able to read; in the program, students will be assigned to undergo an extensive reading activity.
4. **New Teacher:** New teachers are urged to follow a workshop on using multi-sensory method for primary students to prepare them to implement the method later on.
5. **Parents:** Parents must develop a sense of being prepared to go to school for their children. The children's needs and their development stage must be the foremost concern during this process. Thisprevents the children from being forced to read too early since activities to promote school readiness and to stimulate their learning maturity are conducted during learning at the pre-school level.

A number of remmondations of this study include the development of a theory of multisensory instructional methods that can be used not only for children with special needs but also for children in public schools. Secondly, to improve the ability of early reading in the first grade of primary school, there is the foundation program of reading-writing and numeracy for 2-3 months in the begining of school years,. Last but not least, it is necessary for parents to pay attention to the readiness of schooling and learning in accorandce with the needs of children and the stage of child development. This is especially related to the ability of early reading. Early childhood education program can prepare school readiness in terms of social and emotional stimulation of maturity of children through play activities instead of drilling the reading ability. The boundaries of future research related to the development of early reading learning models using multisensory methods. in this development developed a model of learning activities using multisensory method for first grade in primary school. In it will be studied about the design of

learning, the media used in accordance with the design of learning activities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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