The International Journal of Indian Psychology
ISSN 2348-5396 (e) | ISSN: 2349-3429 (p)
Volume 6, Issue 4, DIP: 18.01.103/20180604
DOI: 10.25215/0604.103
http://www.ijip.in | October-December, 2018

The International Journal of INDIAN PSYCHOLOGY

Research Paper

Effectiveness of Keyword Mnemonic Strategies to Increase the Math Vocabulary of Slow Learner Students

Andi Ahmad Ridha[1]*, Duta Nurdibyanandaru[2]

ABSTRACT

The slow learner characteristics that students have affect their ability to understand specific concepts / information such as understanding the basic concepts of mathematics. This has a negative impact on the failure of students' vocabulary to slow learning. This study aims to determine the mnemonic keyword strategies in increasing vocabulary acquisition and retention of mathematical vocabulary in students with the slow learner. Mnemonic keywords strategy strategies are strategies that differ between information that will be used for students with information that students already know. Information that has been used by students as a keyword that helps students remember the new information they teach. The study design was a multiple-baseline design on subjects in three slow-learning junior high school students with 12-15 years of income. The intervention given to the subject is in the form of vocabulary prospects with mnemonic keyword strategies. The data chase technique uses a vocabulary assessment with a reliability of 0.849α which measures vocabulary acquisition and vocabulary retention. The research data was determined by determining the results of each research subject and using the Wilcoxon t test statistical analysis. Descriptive results show that the vocabulary of students' vocabulary and retention of slow mathematical vocabulary can be improved through a mnemonic word intervention strategy. Meanwhile, the results of the analysis show that the mnemonic keyword strategy is effective in increasing the acquisition of vocabulary and the retention of students' vocabulary with the slow learner. The implication is that this research can be the basis for developing more complex slow student mathematics.

Keywords: *The Mnemonic Keyword Strategy, Math Vocabulary Acquisition, Math Vocabulary Retention, Slow Learner*

Slow learner is a term that is attached to students who have an IQ below the average but above the range of 70 which is the limit of students can be categorized as experiencing intellectual disability / mental retardation. The failure rate of slow learner students in learning

[1](Department of Educational and Developmental Psychology, Postgraduate Program Master of Professional Psychology, Faculty of Psychology, Airlangga University, Indonesia)
[2] (Department of Educational and Developmental Psychology, Lecturer of Psychology Faculty, Airlangga University, Indonesia)
*Responding Author

Received: November 12, 2018; Revision Received: December 23, 2018; Accepted: December 29, 2018

is higher because of the lack of tolerance given to students and students still take standard tests that apply to students in general (Shaw, 2010). Being able to learn and become a well-functioning person is very important for slow learner students. Therefore, support is needed to facilitate so that the slow learner students can learn and develop themselves (Ahmad et al., 2015).

Slow learner are students who are unable to overcome the academic method as given to other students. Slow students need more time and sometimes the lessons given must be tailored to the conditions of the students. But slow students are still expected to meet academic requirements in the general education program achieved by their friends. Slow students have special needs for special assistance but do not meet the requirements for students with an IQ below 70 who qualify (Burgner, 2010).

The limitations of the cognitive functions of the slow learner students cause students to experience difficulties in managing the new information they obtain (Shaw, 2010). Apart from the limitations of the cognitive functions of the slow learner students, there are a number of needs of each student that need to be developed so that they can live their lives properly, ie slow learner students must be able to read and understand reading, can use spoken and written languages, can use simple mathematical operations that useful in everyday life, and enough to have mastery of the basic vocabulary that can be used to interact (Anderson, 1956). Slow learner students 'academic achievement, which tends to be below average and the obstacles they have in managing information, affects students' ability to read, language development, mathematics learning abilities, and social sciences (Griffin, 2005).

According to data from the Ministry of Social Affairs of the Republic of Indonesia (Hasyim, 2013) in 2011 that the number of children with special needs in Indonesia had reached 7 million people or around 3% of the total population in Indonesia which amounted to 238 million. Of these, 60% are slow learners, autistic, and mentally retarded students. Lisdiana (Aziz, et al., 2015) argued that slow learner students can be found in every inclusive school, around 14.1% of children including the slow learner. In Surabaya, in 2009 slow learner students numbered 1,123 people. Of these, 356 students are junior high school students (Amelia, 2016).

The results of Baucum's research (1967) on the mathematical abilities of slow learners showed that students had low reading skills. Although all students had weaknesses in mathematical abilities, only 19% of the 204 students expressed their disinterest in learning mathematics. Kroesbergen and Vanluit (Shaliha, 2017) suggest that the problems of slow learners in learning mathematics, basically are in the mastery of basic mathematical counting operations which include addition, subtraction, multiplication, and division. Based on research conducted by Geary (Shaliha, 2017) it was found that around 5-8% of students who have limited cognitive function, are associated with concepts or procedures in mathematics.

Slow learner students experience problems in math counting operations caused by the characteristics of the slow learner they have. Slow learner students have a low IQ, lack of vocabulary, memory and low concentration. To learn mathematics, attention is needed to mathematics and students' understanding is needed regarding basic information or basic vocabulary related to the mathematics lesson. Before teaching students the slow learner skills in counting, students must first have knowledge related to the count. Therefore, the importance of strengthening the understanding of mathematical vocabulary for slow learner students as a basis for improving their numeracy skills (Siegel, 2017).

Information acquisition initially requires perception and attention to the information in question. The information obtained is then through the encoding process so that it is stored in the students' memory. What happens to slow learner students in learning mathematics is that students are less able to manage the information provided so that the information taught related to math counting operations cannot be understood by students (Solso, et al, 2008). Amelia (2016) added that lack of attention to information is one of the factors that causes slow learner students to have low memory / memory. Slow learner students cannot store information for a long time so they cannot recall information when needed. The attention span of the slow learner students is relatively short and the concentration is low. Slow learner students cannot concentrate in the learning process delivered by the lecture method for more than thirty minutes.

The ability of slow learners is very limited in understanding abstract material (language, vocabulary, number, and concepts) and reasoning ability in practical situations is lower than most students. Students also cannot handle more complex school assignments. Students need a lot of external stimulation and encouragement to complete school work (Chauhan, 2011). Slow learner students have problems with abstract thinking such as in social studies, lack of vocabulary, or mathematical problems. This is because students have a short attention span and low concentration (Borah, 2013). Therefore, it can be said that although slow learner students have limitations in cognitive functions but by providing certain teaching strategies that are appropriate to the conditions of the slow learner students, they are expected to develop students' academic abilities.

Slow learner students can be motivated to provide the best learning outcomes through various teaching strategies (Sebastian, 2016). Chauhan (2011) explained that in order to help slow learner students, the school should provide a special curriculum, apply special teaching and teaching methods, provide guidance and attention, provide extracurricular activities that are in accordance with the wishes of students, and evaluate the progress experienced by students. Carrol (1998) explains that teachers should use specific strategies in teaching slow learner students, by lowering expectations, using concrete sentences, using visual cues, and allowing students to repeat the material being taught.

The preliminary study that the author did in X inclusion Middle School in Surabaya in 2017 showed that slow learner students had problems in understanding basic information / mathematical concepts so that it had an impact on the skills of students who were low in math counting operations. Slow learner students at the school numbered 31 students. IQ is in the range of 70-90. From the results of psychological examinations conducted by the school, it can be seen the mathematical profile of the slow learner students, namely: students do not know the basic concepts of measurement in mathematics, are less able to understand information related to mathematics subject matter such as mastering basic concepts which include definitions and uses of the concept, students are less able to remember the information that has been conveyed, and are less able to restate information when needed.

According to information from a special companion teacher (SCT), these students have low math scores so often the teacher lowers the standard of assessment because these students have not been able to work on the calculation questions in multiplying or dividing. Students are only able to perform simple counting operations such as adding and subtracting nominal numbers from 0-100. In addition, students are only able to understand concrete mathematical lesson concepts so that if the lesson has entered abstract concepts such as exponents, graphs,

coordinate points, search for equations, functions, volumes, and diversity, students have difficulty understanding it and usually because students feel difficulties in class, eventually students prefer to leave the class rather than being in class.

The data obtained above shows that slow learner students at Surabaya X inclusion junior high school experience learning problems related to the production of symbol / coding information so that the information / vocabulary of students is less developed. Students producing information problems have felt difficult and will result in not being eager to learn. This shows that slow learner students need learning assistance related to information coding. These needs are very important because they involve the basic competencies of counting, reading, and writing that are needed in various fields of daily activities. Therefore, before teaching slow learners about numeracy skills first students need to be taught about vocabulary that students have not understood so that it is easier for students to understand mathematical counting operations. For example, before teaching students about addition, students must first understand the meaning of summing up and understanding the meaning of numerical concepts / terms in mathematics (Mumpuniarti et al, 2012).

The results of research conducted by Gentile et al. (1982) for slow learner students and regular students aged 12-14 years, by teaching 30 general English vocabulary lists and within a predetermined time period, students are asked to recall the vocabulary that has been taught and the results show that students learn more slowly quickly forget the vocabulary he just got compared to regular students.

Slow learner students in inclusive X junior high school get class teaching as other regular students. Teachers teach by lecture methods and pay more attention to regular students. If the slow learner students cannot understand the explanation from the teaching teacher, then the teacher does not provide repeated teaching and does not provide easier assignments to the slow learner students. The teacher gives the same task between slow learner students and regular students. Learning assessment also has the same criteria so that in the class of the slow learner students feel left behind in many lessons. Slow learner students who cannot survive in the classroom, prefer to be in the source room.

In mathematics, the teacher teaches on the board and asks regular students about his understanding of the teacher's explanation. If regular students can understand the teacher's explanation, the teacher will proceed to the next material. But if the slow learner students who cannot understand the teacher's explanation, the subject teacher only asks students to work on mathematical questions as much as possible without providing further teaching on the lack of understanding of the slow learner students.

Slow learner students who are in the source room are given lecture teaching methods and use subject matter more easily. But in the source room there are so many students with various types of specialties, while the teachers in the source room only number four so that the teacher's attention to the slow learner students is not optimal. The teacher provides teaching with conventional methods that focus on working on the questions / exercises working on the problem. At the time of the examination of the answer, when the slow learner students are wrong in answering the question, the teacher gives the student a mistake and teaches the correct answer. The teaching process by providing practice questions is considered ineffective because the condition of the source space is less conducive and less comfortable in the teaching and learning process.

From the learning process of the slow learner students in the X inclusion junior high school, it is known that slow learner students still get teaching using conventional methods. The teaching teacher does not adjust the learning process to the characteristics of the slow learner students so that students cannot follow the learning process properly. Therefore, an intervention is needed that can help slow learner students in increasing vocabulary acquisition and vocabulary retention. Schwarz (Santrock, 2011) suggests that barriers to learning consist of various shapes and sizes that require certain strategies to ensure that all students can mobilize all their potential to achieve learning achievement. Many regular students and students who have limited cognitive functions have difficulty learning the information. Therefore, the more sensory devices used in the learning process, the more likely students will learn better. Heiter (Santrock, 2011) suggests that mnemonic strategies can help students remember information in lessons. Levin, et al. (1985) added that the method keyword in vocabulary learning has proven to be a very effective technique for learning new vocabulary especially for tasks that require understanding.

The results of Lubin and Polloway's (2016) study show that effective mnemonic strategies are used to improve student performance, not only for regular students but also for students with learning problems including learning disability or mild intellectual disability. In addition, Scruggs and Mastropieri (Lubin & Polloway, 2016) in their study explained that mnemonic strategies are effective in teaching students who have limited cognitive function. Mnemonic strategies help students optimize their cognitive functions. Mnemonic strategies can be used effectively not only to improve memory skills, but also improve performance in studying various fields of study, including foreign languages, English, science, history, mathematics and social sciences.

Terril, et al. (2004) showed that students who had limited cognitive function given a mnemonic strategy intervention could remember vocabulary much greater than students who were not given a mnemonic strategy intervention. Further explained that individually, each student experienced an increase in vocabulary test scores after using the mnemonic strategy. Mostafa and El Midany (2017) in their research also showed that the use of mnemonic strategies is very useful and is often used to teach information in surgery. Further explained that memorizing information can cause difficulties in the learning process and have side effects that hinder academic achievement. Mnemonic strategies can be used to improve the ability to remember and the process of calling information becomes easier, especially for students with limited cognitive abilities.

Based on the explanation above, it can be said that the mnemonic strategy is a special strategy in remembering information that is proven to be effective in improving students' ability to remember, not only for regular students but also beneficial for students who have limited cognitive function. Although there is no research that states that the mnemonic strategy can improve the ability of slow learners in learning vocabulary but by looking at the characteristics of the slow learner and teaching alternatives that can be given to slow learner students, then the mnemonic keyword strategy can be used as an alternative in developing student vocabulary.

Mnemonic strategies have been used frequently enough to improve student performance in learning social science, history, and language. But there is little research on the impact of mnemonic keyword strategies for increasing students' mathematical vocabulary. Mathematical vocabulary becomes important to study because vocabulary is the main basis

students must have before learning mathematical counting operations. Therefore, the authors feel interested in examining the effectiveness of the mnemonic keyword strategy in developing the mathematical vocabulary of slow learners.

METHODOLOGY

The research that will be carried out includes the type of small-N design experimental research which aims to determine the effectiveness of the mnemonic keyword strategy towards acquisition and the slow learner mathematics vocabulary retention. This type of small-N design research is an experimental research conducted systematically and carefully on one individual or small group of individuals to see the effect of manipulating independent variables. The design used in this study is a multiple-baseline design that aims to see changes in behavior of each slow learner student who is given intervention with a predetermined baseline (Goodwin, 2010). Myers and Hansen (2006) add that multiple-baseline design is used to study the behavior of one subject or several subjects. In this study, multiple-baseline design across the subject was used, namely that all research subjects received the same intervention by first ensuring that the research subjects had the same characteristics in accordance with the research objectives.

Hypothesis

1. The mnemonic keyword strategy increases students' math vocabulary acquisition with slow learner.
2. The mnemonic keyword strategy increases students' math retention vocabulary with the slow learner.

Research Subject

The subjects in this study were three inclusion X junior high school students who had been identified as slow learners who had difficulty remembering basic mathematical concepts. Subjects are determined based on recommendations from a special companion teacher (SCT). An IQ test is then performed to determine IQ grade, vocabulary, and knowledge of the subject's mathematical operations.

The subject criteria in this study are: 1) Inclusion Middle School Students X. The assignment of junior high school students is based on the assumption that the junior high school level is a transition period from elementary school to senior high school level and existing subjects have more abstract concepts, especially in mathematics. Inclusion X junior high school was chosen because it was considered to represent the conditions and characteristics of slow learner students, and the process of screening slow learner students in schools involved psychologists who had practice permits; and 2) Students belong to the slow learner category. Determination of slow learner students is based on the results of assessment conducted by the school at the time of student admission inclusion and test results conducted by the author to find out the subject IQ class.

Research Variable

Independent Variable (X) is a mnemonic keyword strategy. Keyword Mnemonic is a method used to study information that is relevant to students and helps students improve their memory ability. Mnemonic strategy keywords in the form of interactive images, vocabulary to be taught, and vocabulary students have looked at (keywords). Interactive images include keywords and meanings of words that teach.

Dependent variable (Y1) is the acquisition of vocabulary. Vocabulary mastery is a new vocabulary that is understood / mastered by students that comes from various vocabulary that has been obtained after certain information / vocabulary information. In this study, the acquisition of vocabulary called is the amount of mathematical vocabulary obtained by students after mathematics vocabulary learning. Dependent variable (Y2) is vocabulary retention. Vocabulary retention is a long-term information store. The information used by students in sufficient time is wider than the number they know and is done in the same time after the process of the process is completed. In this study, the vocabulary retention that was discussed was the number of vocabulary students gained after a pause during the time since the last day of the math vocabulary.

Research Instrument

The instrument in this study used vocabulary assessment to determine the vocabulary acquisition that was obtained by the research subjects after the administration of the keyword mnemonic intervention strategy and to find out the vocabulary retention that was obtained by the subject after the entire series of studies was completed. Vocabulary assessments along with the keyword mnemonic intervention program are prepared based on the vocabulary material contained in the seventh grade mathematics textbook published by the Ministry of Education and Culture. Vocabulary assessment as a whole consists of 20 items of recognition questions that can reveal mathematical vocabulary given to research subjects using the mnemonic keyword strategy. Vocabulary assessment consists of 4 units of vocabulary (numbers, set, algebra, and comparison) so that each unit consists of 5 items of vocabulary questions.

The validity of the research instrument was estimated using the type of content validity. The research instrument in the form of a vocabulary assessment along with a mnemonic keyword intervention program has been through a validation process by three experts. In addition, this study uses item validity or commonly called discriminating power. The tested research instrument is a vocabulary assessment consisting of 30 items. The range of item discrimination index for vocabulary assessment ranges from 0.281 to 0.697 by aborting 10 items so that it leaves 20 items of assessment vocabulary. While the reliability of this research instrument is estimated using an internal consistency approach. In this study, reliability estimation uses the internal consistency approach of alpha (α) through the help of IBM SPSS Statistics 21. Based on the results of the analysis, an estimate of reliability for 20 vocabulary assessment instruments was obtained, namely 0.849 Cronbach's Alpha.

Procedure

The study was conducted using multiple-baseline design across the subject. Baseline is collected from all research subjects during unit 1 vocabulary sessions. During unit 2 vocabulary sessions, subject A receives a mnemonic keyword intervention while subjects B and C remain in baseline conditions. During the unit 3 vocabulary session, subject A and B received the mnemonic keyword intervention while the other subjects were still in the baseline condition. During unit 4 vocabulary sessions, all research subjects received a mnemonic keyword intervention.

Data Analysis

The data analysis technique in this study used descriptive statistics that aimed to summarize the data collected from the study sample. Descriptive statistics help researchers to understand a number of data to be more meaningful (Goodwin, 2010). In addition, graphs can be used to

conclude research data that has been collected. With graphics, data can be delivered well, can describe aspects of data, and data becomes easier to understand (Clark-Carter, 2004). The results of this study were also analyzed statistically using The Wilcoxon T test to test both hypotheses in this study. Statistical analysis utilizes IBM SPSS Statistics 21 assistance.

RESULTS

Descriptive Discovery

Vocabulary Acquisition

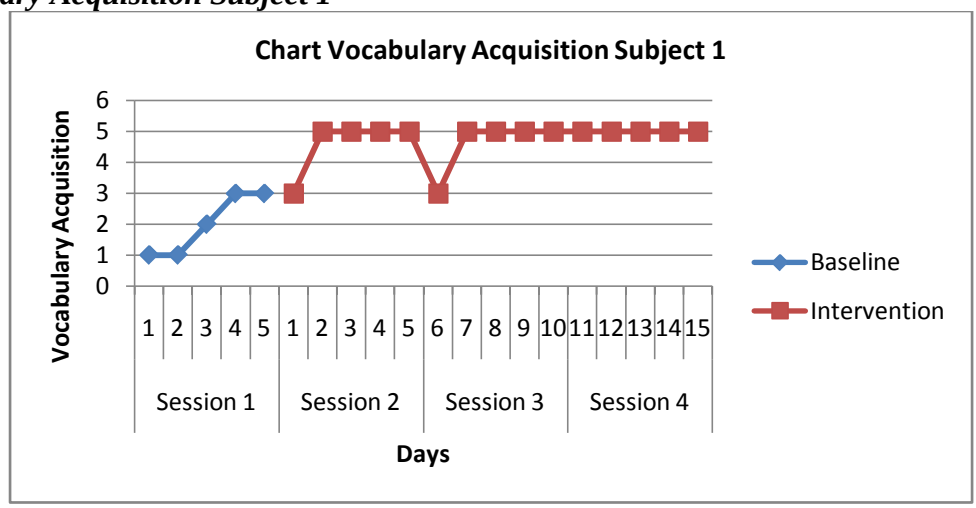
Vocabulary acquisition is measured using a vocabulary assessment (fill in the blank). Values are collected and calculated to determine the mean of vocabulary acquisition. The description of the mean of each unit can be seen in table 1.

Table 1. Mean dan Standar Deviasi Vocabulary Acquisition

Subject	*Vocabulary Acquisition*							
	Unit 1		Unit 2		Unit 3		Unit 4	
	Baseline		Intervensi					
	Mean	SD	*Mean*	SD	*Mean*	SD	*Mean*	SD
A	2,00	1,000	4,60	0,894	4,60	0,894	5,00	0,000
B	2,00	1,000	1,60	0,894	4,40	0,894	4,20	0,837
C	1,60	0,894	1,00	0,707	1,60	1,140	4,60	0,548

In unit 1, when all research subjects are in baseline conditions, the mean obtained is 1.86. In unit 2, the mean of the study subjects who received the mnemonic keyword intervention was 4.60 and the study subjects who did not receive the mnemonic keyword intervention were 1.30. In unit 3, the mean of the study subjects who received the mnemonic keyword intervention was 4.50 and the study subjects who did not get the mnemonic keyword intervention were 1.60. In unit 4, when all research subjects get a mnemonic keyword intervention, the mean obtained is 4.60. The description of vocabulary acquisition for each research subject is presented in chart form.

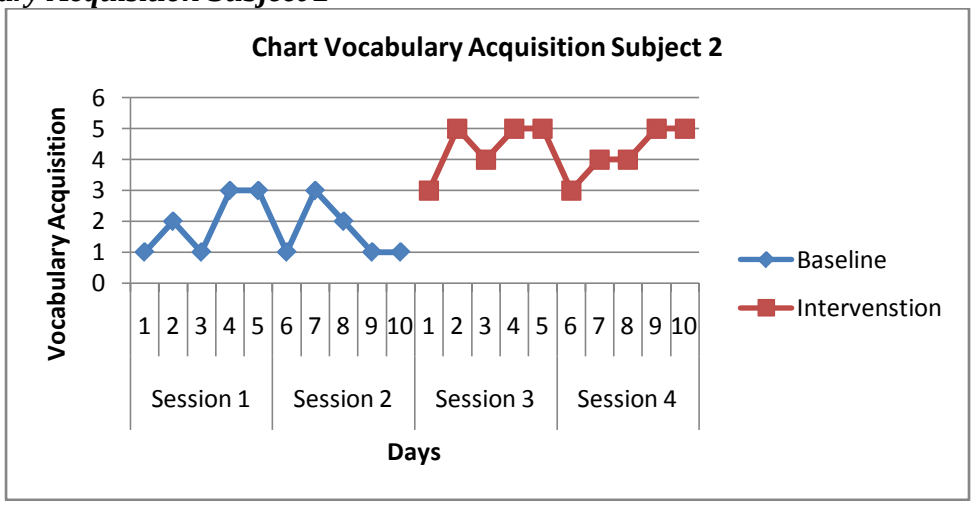
Vocabulary Acquisition Subject 1



The basic value of subject A maintains between 1-3 when running vocabulary with conventional methods. Subjects have increased vocabulary since receiving mnemonic keyword interventions in vocabulary units 2. The values obtained by subjects occur in units

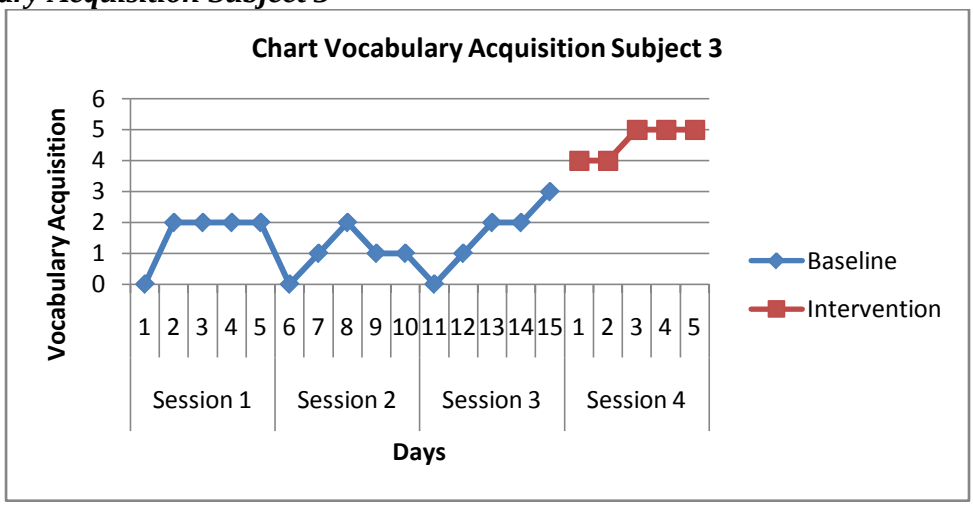
2, 3, and 4. Only at the beginning of the vocabulary in units 2 and 3, the subject still requires an examination of the new vocabulary words taught the value obtained is low. Overall, the value of the A vocabulary treasury since receiving the mnemonic keyword intervention received between 3-5. Subject A shows the highest acqusition vocabulary on unit 2, 3, and 4 vocabulary, and the lowest price level in vocabulary units 1. Subject A accepts mnemonic keyword interventions in units 2, 3, and 4.

Vocabulary Acquisition Subject 2



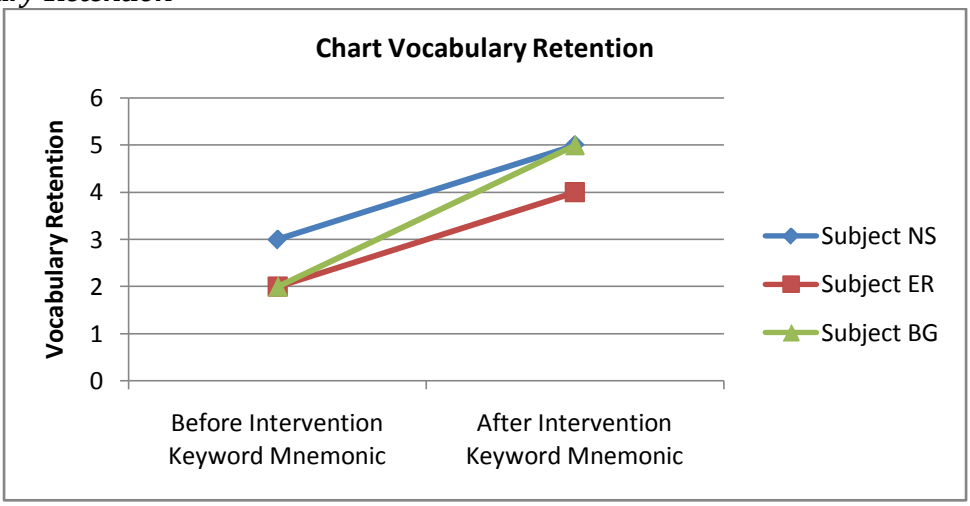
Subject B baseline values range from 1-3 when taught vocabulary with conventional methods. Subjects experienced an increase in vocabulary acquisition since receiving the mnemonic keyword intervention in unit 3 vocabulary. The scores obtained by the subject increased in units 3 and 4. Subjects were long enough to adjust the teaching vocabulary in each unit so that the data experienced instability at the beginning of teaching vocabulary. Overall, subject B's vocabulary acquisition since receiving a mnemonic keyword intervention ranged from 3-5. Subject B shows the highest acquisition of vocabulary acqusition on unit 3 and 4 vocabulary, and the lowest acquisition rate for unit 1 and 2 vocabulary. Subject B receives mnemonic keyword intervention in units 3 and 4.

Vocabulary Acquisition Subject 3



Subject C baseline values ranged from 0-2 when taught vocabulary with conventional methods. Subjects experienced an increase in vocabulary acquisition since receiving a mnemonic keyword intervention on unit 4 vocabulary. Subjects still made adjustments to vocabulary teaching in each unit so that the scores obtained at the beginning of teaching vocabulary in each unit showed low scores. Overall, C subject acquisition acquisition vocabulary since receiving a mnemonic keyword intervention ranged from 3-5. Subject C shows the highest acquisition of vocabulary acqusition at unit 4 vocabulary and the lowest level of acquisition on unit 1, 2, and 3. vocabulary subject B receives a mnemonic keyword intervention in unit 4.

Vocabulary Retention



Vocabulary retention is measured using a vocabulary assessment (fill in the blank). Measurements are taken after one week from the last meeting in the unit 1 vocabulary session to obtain vocabulary retention data before being taught with a mnemonic keyword strategy. Meanwhile, measurements were also made after one week of the last meeting in the unit 4 vocabulary session to obtain vocabulary retention data after being taught with a mnemonic keyword strategy. All research subjects showed an increase in vocabulary retention before and after being given a mnemonic keyword intervention.

Results of Statistical Analysis

The first hypothesis in this study was tested using The Wilcoxon T test with the help of IBM Statistics SPSS 21. The results of the data analysis showed $p = 0.001$, ($p < 0.05$), which indicated that there was a significant difference in vocabulary acquisition before and after being given a teaching intervention vocabulary using the mnemonic keyword strategy. The second hypothesis in this study was tested using The Wilcoxon T test with the help of IBM Statistics SPSS 21. The results of data analysis showed a value of $p = 0.023$, ($p < 0.05$), which indicated that there was a significant difference in vocabulary retention before and after being given a teaching intervention vocabulary using the mnemonic keyword strategy.

DISCUSSION

Keyword Mnemonic Strategies and Vocabulary Acquisition Mathematics

Based on the results of the descriptive analysis, the three study subjects showed an increase in vocabulary acquisition during the administration of a mnemonic keyword intervention. Before the intervention was given at the baseline stage, the three research subjects were

taught mathematical vocabulary using conventional methods. Subject A and B can reach 3 points, while subject C only reaches 2 points. After entering the intervention phase, when the research subject was given an intervention in the form of teaching math vocabulary with a mnemonic keyword strategy, the three research subjects were able to reach the highest point, namely 5 points.

The results of the descriptive analysis were reinforced by statistical analysis using The Wilcoxon T test. The results of the statistical analysis showed that there were significant differences in vocabulary acquisition before and after the vocabulary teaching intervention was given using the mnemonic keyword strategy. Thus, it can be concluded that the three research subjects can increase vocabulary acquisition after getting an intervention. In other words, the mnemonic keyword strategy is effective in increasing students' math vocabulary acquisition with slow learner.

The results of this study are in line with previous studies conducted by Terril, et al (2004) that mnemonic keyword strategies can help develop vocabulary possessed by students with limited cognitive function. In addition, the results of this study are also in line with research conducted by Wyra, et al (2007) that the mnemonic keyword strategy is effective in increasing foreign language acquisition vocabulary. The results of this study are also in line with previous studies conducted by Marzban and Amoli (2012) that the mnemonic keyword strategy is effective in increasing vocabulary acquisition as soon as the information teaching process is given to elementary school students.

From the results of descriptive analysis and statistical analysis of vocabulary acquisition obtained by the three research subjects. The three study subjects showed increased vocabulary acquisition after entering the intervention phase with keyword mnemonic. However, there are several vocabulary acquisition acquisitions that have decreased after previously experiencing an increase in value. This indicates that the vocabulary taught is still in short-term memory. Information that is in short-term memory is limited. The results of the IQ tests of the three research subjects showed that the short-term memory of the subject belonged to the weak category. Research subjects have difficulty maintaining information for quite a long time. Sousa (2012) argues that the newly taught information can be forgotten immediately because the information is still in short-term memory (immediate memory) which if not reinforced will immediately come out of memory. In addition, during the process of giving intervention or measuring vocabulary acquisition, things often happen that are beyond the control of the researcher such as noise from outside the room. This also influences the concentration of research subjects so that it has an impact on the less optimal vocabulary acquisition.

Therefore, according to the characteristics of the slow learner students and so that information in short-term memory can be forwarded to long-term memory, then the information provided is repeated repeatedly. In implementing the intervention, vocabulary teaching was given with a mnemonic keyword strategy repeatedly, so that the vocabulary acquisition obtained by the subject could increase. Sousa (2012) suggests that giving meaning and meaning to new learning can only occur if students have enough time to process and repeat it. Mumpuniarti, et al (2012) added that slow learner students are less able to understand the meaning of symbols and have low abstraction power so that slow learner students need learning models with more concrete media, actively involve all senses, and are associated with everyday experiences as media concrete for things that are symbolic so that the information taught can be forwarded to the memory of students.

This is in accordance with the theory put forward by Dudai (2002) that vocabulary acquisition is basically an embodiment of information stored in short-term memory. Solso, et al. (2008) further explained that short-term memory is a temporary storage place for information transmitted from sensory processes. Short-term memory has a limited capacity and if information is not repeated, then the information received will be erased from short-term memory. Although short-term memory has a smaller capacity than long-term memory, short-term memory has an important role in memory processing.

Lloyd Peterson and Margaret Intons-Peterson (Solso, et al., 2008) state that information storage capacity in short-term memory is temporary, very limited, and prone to information waning quickly if the individual does not rehearse the information. Information in short-term memory if not repeated will be erased from short-term memory. It was further stated that the duration / duration of information in short-term memory is ± 12 seconds without repetition and can be more than that if accompanied by repetition.

Wyra, et al. (2007) suggest that mnemonic keyword strategies are effective strategies for gaining vocabulary. Further explained that the keyword mnemonic strategy is a method for remembering information using keywords in the form of previous information that is already known and equipped with images that explain the information that will be remembered. The three study subjects showed better vocabulary acquisition after being given a mnemonic keyword intervention. Broun (Ahmad et al. 2015) explains that the use of visual cues effectively maintains attention, helps slow learner students understand abstract concepts more easily, reduces anxiety about academic learning situations, and helps express their ideas better.

The three research subjects had limited vocabulary and memory capacity so that it influenced the understanding of the subject related to the information needed in the learning process. In addition, the three research subjects belonged to students with low socioeconomic status and had parents who did not understand the importance of education for the research subject. This has an impact on the low interest of research subjects in learning. The conditions experienced by research subjects, in accordance with the theory put forward by Baker, et al (1992) that basically vocabulary acquisition is very important to improve academic ability. However, there are several factors that influence the development of students in learning as suggested by Sousa (2012), namely the internal condition of students in understanding the instructions / signals that can be used to stimulate the calling of memory. In addition, context factors remember, remembering information accurately can occur if the context of remembering is done very similar to the context when the information was first learned. And the information storage system in the areas that receive and process the stimulus is internal factors that contribute to differences in vocabulary students have.

Keyword Mnemonic Strategies and Mathematical Retention Vocabulary

Based on the results of the descriptive analysis, the three research subjects showed a better increase in vocabulary retention after the provision of mnemonic keyword interventions. Before the intervention was given at the baseline stage, after the three research subjects were taught mathematical vocabulary using the conventional method, vocabulary retention measurements were carried out after one week from the last meeting at the baseline stage. Subject A can reach 3 points, while subject B and C only reach 2 points. After entering the intervention phase, when the research subjects were given an intervention in the form of teaching math vocabulary with a mnemonic keyword strategy, vocabulary retention measurements were carried out after one week from the last meeting at the intervention stage.

Subjects A and C can reach the highest point, which is 5 points, while subject B can reach 4 points.

The results of the descriptive analysis were reinforced by statistical analysis using The Wilcoxon T test. The results of the statistical analysis showed that there were significant differences in vocabulary retention before and after the vocabulary teaching intervention was given using the mnemonic keyword strategy. Thus, it can be concluded that the three research subjects can increase vocabulary retention after getting an intervention. In other words, the mnemonic keyword strategy is effective in increasing students' math retention vocabulary with slow learners. After going through the intervention phase given repeatedly, the three research subjects showed significant progress. Sousa (2012) suggests that to keep information intact, students must repeat the same information. Amelia (2016) adds that the lack of attention of slow learner students to information is one of the factors that causes slow learner students to have low memory. Slow learner students cannot store information for a long time so they cannot recall information when needed. The attention span of the slow learner students is relatively short and the concentration is low. Slow learner students cannot concentrate in the verbal learning process for more than thirty minutes. Therefore, repeated teaching, accompanied by the use of concrete learning media, and involving all sensory tools in learning are very necessary for slow learner students so that the information taught can be stored in long-term memory.

The results of this study are in line with previous research conducted by Lubin & Polloway (2016) that the keyword mnemonic strategy is effective in increasing the retention vocabulary of scientific information and improving students' memory with limited cognitive function. The results of this study are also in line with the research conducted by Lawson and Hogben (1998) that mnemonic keyword strategies can help students maintain the foreign language vocabulary information they have learned in a certain period of time. In other words, it can be concluded that the mnemonic keyword strategy helps students maintain vocabulary retention in learning foreign language vocabulary. The results of this study are also in line with previous research conducted by Marzban and Amoli (2012) that the mnemonic keyword strategy is effective in increasing vocabulary retention after two weeks since the information teaching process is given to elementary school students.

From the results of the descriptive analysis and statistical analysis of the vocabulary retention obtained by the three research subjects, it was found that there was an increase in the value of the vocabulary retention held before and after being given a mnemonic keyword intervention. At the baseline stage, the three subjects were taught vocabulary with conventional methods. Measurement of vocabulary retention is done after one week from the last meeting at the baseline stage. Meanwhile, at the intervention stage, the three research subjects were taught vocabulary with a mnemonic keyword strategy. Measurement of vocabulary retention is carried out after one week from the last meeting at the intervention stage. The results of data analysis showed that the three research subjects experienced an increase in vocabulary retention at the intervention stage. This indicates that the vocabulary taught is in long-term memory. After repeated teaching, subjects can pass on the information they teach from short-term memory to long-term memory. The three subjects were able to maintain the vocabulary they taught after one week the intervention was stopped. The vocabulary taught by the subject has increased because the subject is taught vocabulary using a keyword mnemonic strategy which is a strategy to facilitate students in remembering information quickly.

This is in accordance with the theory put forward by Dudai (2002) that vocabulary retention is basically an embodiment of information stored in long-term memory. Solso, et al. (2008) explain further that the ability of individuals to understand information from the past and use that information to process the present is a function of long-term memory. Long-term memory capacity is very broad to accommodate a variety of information, even vague information can be remembered and stored in long-term memory.

Hebb (Solso, et al., 2008) explains that the process of storing information in long-term memory involves information processes that are always repeated so that information in short-term memory can be forwarded to long-term memory. Further explained that there is information that can be easily stored in long-term memory that is if the information has meaning. If the information is combined with other meaningful memories, there will be increased memorability (ease of memory to remember).

The results of this study indicate that students with slow learner experience the development of mathematical vocabulary after being given a mnemonic keyword intervention. Shapiro (Nelson, et al., 2013) suggests that students who successfully store basic mathematical information / vocabulary in memory and can take that information easily, then students are predicted to develop skills to solve various complex problems and interpret mathematical principles that are abstract in nature.

Based on the results of interviews with the three research subjects, it was found that subjects preferred the teaching of mathematical vocabulary with a mnemonic keyword strategy because students felt more understanding of the meaning of words if they were equipped with pictures and there were explanations in the form of brief illustrations often encountered by subjects in their daily lives. This is in line with Olson's (2015) research that students enjoy the challenge of mastering mathematical operations. Students like conditions that are relaxed in learning, look more independent, and listen to other students in practicing counting operations.

CONCLUSION AND SUGGESTION

Based on the results of the research that has been done, it can be concluded that the keyword mnemonic strategy is effective for increasing vocabulary acquisition and mathematics retention vocabulary for students with slow learner. The results showed that after getting intervention with the mnemonic keyword strategy, students with the slow learner experienced an increase in the acquisition of mathematical vocabulary. Subsequent researchers who wish to conduct similar studies related to the use of mnemonic keyword strategies and the development of mathematical vocabulary in slow learner students, are advised to: 1) ensure students' comfort before participating in interventions to ensure the effectiveness of intervention and measurement of vocabulary assessment can be optimized; 2) the next researcher can make two types of vocabulary assessment instruments that measure the same aspects; 3) pay attention to the range of interventions and measurement of vocabulary assessment. The researcher can design a more adequate research time span so that it can guarantee the objectivity of the intervention and measurement of vocabulary assessment; 4) follow up on the results of research on basic mathematical concepts, namely vocabulary acquisition and student mathematics retention vocabulary by examining the mathematics skills of slow learner students.

REFERENCES

Ahmad, S. S., Shaari, M. F., Hashimb, R., & Kariminia, S. (2015). Conducive attributes of physical learning environment at preschool level for slow learners. *Social and Behavioral Sciences*, 201, 110 – 120.

Amelia, W. (2016). Karakteristik dan jenis kesulitan belajar anak slow learner. *Jurnal Ilmu Kesehatan Aisyah*, 1 (2): 53-58.

Anderson, B. H. (1956, Juni). *Teaching the slow-learning child*. The University of Southern California: The Faculty of the School of Education.

Aziz, A. N., Sugiman, & Prabowo, A. (2015). Analisis proses pembelajaran matematika pada anak berkebutuhan khusus (ABK) slow learner di kelas inklusif SMP Negeri 7 Salatiga. *Jurnal Matematika Kreatif-Inovatif*, 6 (2), 111-120.

Baker, S. K., Simmons, D. C., & Kameenui, E. J. (1992). *Vocabulary acquisition: Synthesis of the research*. University of Oregon.

Baucum, N. J. (1967). A study of slow learners with special emphasis in the field of secondary mathematics. *Thesis*. Texas: Faculty of Texas Technological College.

Borah, R. R. (2013). Slow learners: Role of teachers and guardians in honing their hidden skills. *International Journal of Educational Planning & Administration*, 3 (2), 139-143.

Burgner, D. M. (2010). A case study: How middle school administrators, teachers, and special education support staff collaborate to address the academic and social needs of slow-learning students. *Dissertation.* Illinois: Northern Illinois University Dekalb.

Carrol, S. (1998). Slow learner in the regular classroom: A handout for teacher. *Helping Children at Home and School: Handouts from Your School Psychologist*. National Association of School Psychologist (NASP).

Chauhan, S. (2011). Slow learners: Their psychology and educational programmes. *International Journal of Multidisciplinary Research*, 1 (8), 279-289.

Clark-Carter, D. (2004). *Quantitative psychological research: A student's handbook*. (2nd Edition). Hove and New York: Psychology Press.

Dudai, Y. (2002). *Memory from A to Z: Keywords, concepts, and beyond*. New York: Oxford University Press.

Gentile, J. R., Monaco, N., Iheozor-Ejiofor, I. E., Ndu, A. N., & Ogbonaya, P. K. (1982). Retention by "fast" and "slow" learners*. *Intelligence*, 6, 125-138.

Goodwin, C. J. (2010). *Research in psychology: Methods and design*. (6th Edition). America: Wiley.

Griffin, D. (2005). *Slow learners: A break in the circle, a practical guide for teachers*. New York: Woburn Press.

Hasyim, Y. (2013). Pendidikan inklusif di SMK Negeri 2 Malang. *Ejournal UMM*, 1 (2), 112-121.

Lawson, M. J., & Hogben, D. (1998). Learning and recall of foreign-language vocabulary: Effects of a keyword strategy for immediate and delayed recall. *Learning & Instruction*, 8 (2): 179-194.

Levin, J. R., Dretzke, B. J., Presley, M., & McGivern, J. E. (1985). In search of the keyword method/vocabulary comprehension link. *Contemporary Educational Psychology*, 10, 220-227.

Lubin, J., & Polloway, E. A. (2016). Mnemonic instruction in science and social studies for students with learning problems: A review. *Learning Disabilities: A Contemporary Journal*, 14 (2), 207-224.

Marzban, A., & Amoli, F. A. (2012). The effect of mnemonic strategies instruction on the immediate and delayed information retrieval of vocabulary learning in EFL elementary learners. *Procedia Social and Behavioral Sciences,* 46, 4957-4961.

Mostafa, E. A., & El Midany, A. A. H. (2017). Review of mnemonic devices and their applications in cardiothoracic surgery. *Journal of the Egyptian Society of Cardio-Thoracic Surgery*, 25, 79-90.

Mumpuniarti, Rudiyati, S., Sukinah, & Cahyaningrum, E. S. (2012). Kebutuhan belajar siswa lamban belajar (slow learner) di kelas awal sekolah dasar daerah istimewa Yogyakarta. *Artikel Penelitian* (On-line). Diakses pada tanggal 5 September 2017 dari;http://staff.uny.ac.id/sites/default/files/penelitian/dr-mumpuniarti-mpd/kebutuhan-belajar-siswa-lamban-belajar.pdf.

Myers, A., & Hansen, C. (2006). *Experimental psychology*. (6th Edition). America: Thomson Wadsworth.

Nelson, P. M., Burns, M. K., Kanivie, R., & Ysseldyke, J. E. (2013). Comparison of a math fact rehearsal and a mnemonic strategy approach for improving math fact fluency. *Journal of School Psychology*, 51, 659–667.

Olson, K. G. (2015). Building math vocabulary and math operations recognition in a montessori E1 classroom. *Scientific Paper*. Master of Science in Education-Montessori. University of Wisconsin-River Falls.

Santrock, J. W. (2011). *Educational psychology*. (5th Ed.). New York: McGraw-Hill.

Sebastian, V. (2016). Ensuring learning in slow learners. *Educational Quest: An Int. J. of Education and Applied Social Sciences*, 7 (2), 125-131.

Shaliha, N. H. (2017). Strategi membelajarkan matematika pada siswa lamban belajar kelas VIII inklusi di SMP PGRI 1 Sampit. *Jurnal Matematika dan Pendidikan Matematika*, 2 (1): 71-80.

Shaw, S. R. (2010, Februari). Rescuing students from the slow learner trap. *Student Services*. National Association of School Psychologists (NASP).

Siegel, L. H. (2017, Mei). The effectiveness of the mnemonic keyword strategy on math vocabulary learning for students with learning disabilities. *Thesis*. Rowan University.

Solso, R. L., Maclin, O. H., & Maclin, M. K. (2008). *Psikologi kognitif*. (Edisi ke-8). (Cetakan ke-12). Diterjemahkan oleh Mikael Rahardanto dan Kristianto Batuadji. Jakarta: Erlangga.

Sousa, D. A. (2012). *Bagaimana otak belajar*. (Edisi ke-4). Diterjemahkan oleh Siti Mahyuni. Jakarta: Indeks.

Terril, M. C., Scruggs, T. E., & Mastropieri, M. A. (2004, Mei). SAT vocabulary instruction for high school students with learning disabilities. *Intervention in School And Clinic*, 39 (5), 288-294.

Wyra, M., Lawson, M. J., Hungi, N. (2007). The mnemonic keyword method: The effects of bidirectional retrieval training and of ability to image on foreign language vocabulary recall. *Learning and Instruction*, 17, 360-371.

Acknowledgments

Thank you to my parents Drs. H. Badaruddin Abdullah, M.Si., and Dra. Syathirah Azis. Thank you for Muryantinah MH., MPsych. (Ed & Dev)., Psikolog and Tino Leonardi, M.Psi., Psikolog for the suggestions given for the perfection of this research.

Conflict of Interest

There is no conflict of interest.

How to cite this article: Ridha, A, A & Nurdibyanandaru, D (2018). Effectiveness of Keyword Mnemonic Strategies to Increase the Math Vocabulary of Slow Learner Students.*International Journal of Indian Psychology*, *6*(4), 22-38. DIP:18.01.103/20180604, DOI:10.25215/0604.103