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# Understanding learning outcomes: Comparing the effect of spacing instruction versus massed instruction

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**Abstract**

This study is comparing the effects of spacing instruction and massed instruction on Indonesian education students. To fulfill this objective, two intact classes were selected; one as a spacing group and another one as a massed group. Afterward, researcher administering a pre-test measured the skills of participants Islamic education. After that, only then did they receive treatment. In mass classes, the material is taught in an intensive 90-minute session, while the material is taught to space groups in three short sessions (each 30-minute session). After the instructions were carried out, a post-test was carried out in both groups, both mass classes and space groups. Then the post-test result data were analyzed using paired and independent sample t-test. The results showed that there was a significant difference between the post-test spacing group and the mass group. The results of this study indicated that the spacing group significantly outperformed the mass group at the final test. Finally, the implications of the study are discussed.

Keywords: Learning Outcomes**,** Massed instruction, Spacing instruction, education skills;

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## 1. Introduction

The best time to study information is an important decision that students and teachers have to make. Should students start reading their notes today if they learned new knowledge yesterday, or wait a few more days? After the material has been provided by the teacher, how long do they stop before reviewing this information to maximize students' chances of retaining it during the summer vacation? Considering that the end result of this choice is to facilitate continuous learning, it is important to consider how research planning affects memory retrieval. In foreign language learning and teaching, many instructors have been diverted from their role in improving educational outcomes because learners have lost much of the content they previously acquired (Carpenter et al., 2012). Thus, it is unclear to many teachers and students of English as a foreign language (EFL) whether teaching and learning through two or more time-divided sessions (i.e. space distribution instruction) can lead to greater learning than devoting the same amount of time. in one session without intervention, namely mass distribution instructions. (S. W. Miles, 2014); (Bott & Heit, 2004).

In addition, literacy and constant presentation of linguistic entities or constructs are considered important for second / foreign language learning and teaching, especially for the automation of language skills (DeKeyser, 2007); (Ellis, 2002); (Segalowitz, 2010). What is not clear, however, is whether these duplicate inputs should be arbitrary or combined. (Segalowitz, 2010). Learning has been found to develop in cognitive science when iterations of elements to be mastered occur in scattered sequences, as opposed to mass or focused sessions (Segalowitz, 2010). However, several types of observational research have explored the impact of spatial distribution training on learning and teaching of second / foreign languages, despite the many findings about the impact of distance in cognitive science (Serrano, 2012). Given the demands for further study in this area, the scarcity of this study is staggering (Hinkel, 2006).

One of the earliest and most established discoveries in human learning is the distance effect. Recent evidence of this effect dates back to more than one hundred years ago (for example, see Ebbinghaus, 1885/1913), and dozens of previously published papers have identified the advantages of distance instruction (Cepeda et al. 2006; (Mashhadi et al., 2017); (Namaziandost et al., 2019)). The distance effect has also been consistently confirmed in studies of younger learners, such as primary school students (e.g., (Toppino & DiGeorge, 1984)), middle school students (e.g., Carpenter et al., 2009), and preschool children such as young people aged 3 or 4 years, although the subjects in many of these experiments were adult students (eg, Rea & Modigliani, 2009; (Toppino, 1991)).

A well-defined exploration in the existing literature is that for specific purposes, the iteration distance of the target object results in better memory than its repetition mass (called the distance effect) (Cepeda et al., 2006). This trend is resilient through materials, with terms in checklists ((Foos, PW, & Smith, 1974); (Siegel & Kahana, 2014)), pictures in checklists ((Rea & Modigliani, 1987); (Benjamin & Tullis, 2010)), related word pairs in the checklist, and pairs of vocabulary meanings in the checklist (Dempster, 1989). For studying specific mathematical techniques, such as measuring variables (Rohrer & Taylor, 2006), and for studying algebraic abilities, distance effects have also been mentioned (Rickard et al., 2008). Theoretical explanations of the effect of holding distance (relative to mass) are so convincing that fundamental memory experts recommend distance teaching to improve academic achievement ((Cepeda et al., 2006); (Rohrer & Pashler, 2010); (Etemadfar et al., 2019)). Most individuals understand from personal experience that a single exposure is usually not sufficient for successful long-term maintenance if one is to learn something well, be it a data set, idea, ability, or technique. We all know the expression "practice makes perfect." But what is less clear is that pacing training (when it occurs) means a lot: giving space to the original analysis and subsequent exams or practice over time usually contributes to excellent learning rather than allowing the repetition to take place in close sequential continuity. This phenomenon is known as the distance effect (sometimes referred to as the gain of distributed practice) and was first discovered about a century ago by scholars (Ebbinghaus, 1885/1913). Since then, the spaced / distributed values during mass exercise have been demonstrated in numerous studies by cognitive psychologists (Cepeda et al., 2006), and new systematic analyzes of

the effectiveness of different learning methods have given distributed practice one of the highest scores depending on the evidence of testing. known (Dunlosky et al., 2013).

Learning content through two or three independent (i.e. scattered or distributed) sessions over time also results in greater learning than devoting the same amount of time in one session to studying content. Demonstrations are considered to be gathered together where the difference in distance between two or more demonstrations of the same object can be ignored (for example, the same word and biological concept are displayed sequentially without intervention in between). If the distance between demonstrations is higher than 0 (for example, every 5 minutes the specified biology word is repeated or 4 separate biology words have been displayed), then the demonstration is assumed to be spaced or scattered so that it is divided by the time interval not zero. The differences between scattered demonstrations will range from a few seconds to weeks, while the distance between mass demonstrations is zero. (Segalowitz, 2008)

The theory of the spacing effect, which was first put forward by Ebbinghaus (Ebbinghaus, 2013) in 1885, is that knowledge is better acquired and stored when it is reviewed incrementally than in one continuous research session, with a complete continuous study period. The effect of distance has been confirmed in several learning areas, such as mathematics, for knowledge recall (Rohrer & Taylor, 2006), acquisition of L1 vocabulary by children ((Childers & Tomasello, 2002); (Namaziandost et al., 2019)), recall details about physics and pronouncing pictures (Toppino, 1991). In-text processing assignments, distance effects have also been shown to be efficient ((Rogers, 2017); (Seabrook et al., 2005)).

It is necessary to know exactly how far apart the research sessions are to use the most accurate spacing possible. For example, if a medical practitioner wants to maintain strong emergency management skills for 2 years, is there an appropriate timeframe for reviewing these skills? If students have to recall information during a given test break, a significant logistical problem to answer is when repeated analysis of this information can occur.

If spacing enhances learning, then a fair hypothesis might be that learning would benefit from longer distance differences to higher levels. In essence, several experiments investigating the impact of longer distances vs. Shorter distances usually conclude that longer distances are more useful for preservation ((Hintzman, 1974); (Jacoby, 1978); (Mashhadi et al., 2017); (Melton, 1970); (S.Miles & Kwon , 2008); (Namaziandost et al., 2018)). (Kahana & Howard, 2005), for example, reported that term maintenance was better when the term was repeated three times in each of the three presentations with another 6-20 words, as opposed to only two to six other words among each of the three presentations.

The hypothesis that a prolonged distance difference results in better memory retention than a shorter distance difference tends to be supported by Bahrick and his colleagues who investigated long-term word retention. In another study by (Bahrick & Phelphs, 1987), by filling in 6 learning sessions separated by a distance of 0 days (i.e. all sessions occurred on the same day), 1 day, or 30 days, students studied English Translation of many words. Spanish. Final evaluation is offered to all respondents 1 month after the last learning session. For respondents who learned the phrase 30 days apart, the results of this test were the highest. Follow-up analysis found that the preservation of these terms was still higher for people who had a 30-day difference compared to the 0- or 1-day distance after 8 years ((Bahrick & Phelphs, 1987); (Pachur & Olsson, 2012)). However, studies conducted at distance have shown that increasing distance does not necessarily result in greater information retention ((Cepeda et al., 2006); (Verkoeijen et al., 2008); (Smolen et al., 2016)). A possible consequence of waiting too long before analyzing data is that participants may lose much of what they have only recently understood, and this loss can diminish any time-related gain that should be there. This suggests that there may be a decrease in the rate of return to widen the gap.

The significant advantage of using distance effect for the growth of complex mathematical abilities has been verified by (Rohrer & Taylor, 2006). (Moulton et al., 2006) reported that training of specific surgical procedures through staggered increases (spacing distribution) yielded considerably greater results in practice than training via mass distribution practice sessions as verified in a one month delayed

post-test. (Shebilske et al., 1999) stated that in contrast to mass delivery sessions, students mastered the challenges of teaching dynamic computer simulations better with the spatial distribution of practice sessions. This study suggests that distance effect techniques go beyond just learning rote information and can assist in more complex tasks involving a variety of acquired skills for inclusion.

In addition, an ongoing field of study in psychology under the "distance effect" umbrella has existed to investigate the positive effects of distance on learning. The distance effect was associated with increased memory benefits when learning incidents were spaced over a long period of time rather than pooled in one session. (for example (Cepeda et al., 2006)). In general, the different types of iterations, namely re-study and retrieval exercises, need to be separated (Goossens et al., 2014). Cognitive psychology research has revealed that memory practice results in increased memory rather than re-learning in the learning stage (Roediger III & Karpicke, 2006). This phenomenon generally refers to taking an exercise impact or an impact evaluation. The results of the study are in accordance with the memory hypothesis where evaluation has a stronger effect on memory strengthening than repeated studies. Impact research is the most well-established principle (Goossens et al., 2014), but many researchers in the cognitive science field are unaware of its enormous impact. (Ur, 2012), for example, claims that reading words leads to more successful comprehension than word testing. He further noted that the assessment only measures learners' skills, but does not inspire further progress in learning (Ur, 2012).

More importantly, several types of previous research have shown superior learning efficiency from distance teaching compared to mass teaching in learning grammar (SW Miles, 2014), vocabulary ((S. Miles & Kwon, 2008); (Nakata, 2015)) , and reading ((S. Miles & Kwon, 2008); (Nakata, 2015)) (Seabrook et al., 2005). There is emerging evidence that distance distribution training in the preservation of target language constructs is greater than mass distribution training, that is, when learning is assessed after a delayed post-test test. (S. W. Miles, 2014)

Beyond rote learning, distance effects can also be efficient for learning certain skills. (Baddeley & Longman, 1978) suggested that for learners learning touch types, distance training is beneficial. Within a maximum of 6 hours, a participant who practices typing for 1 hour each day reaches the study proficiency goal in 35 hours. It took about 43 hours for the other two groups training 2 hours a day to reach the same level target, and the fourth group who trained for 4 hours a day (two 2-hour sessions a day) reached the target skill after 50 hours of work.

A new methodology has been used by (Lotfolahi & Salehi, 2017) to distinguish various spacing patterns for young EFL students. They instructed EFL students' English-Farsi word pairs to add different spacing patterns for this purpose (mass vs space). The researchers integrated the assessments (with corrective feedback) into several distance patterns to increase the gain from the distance. In other words, EFL students are taught to evaluate each other on their vocabulary skills and to provide each other with feedback. Each week and five weeks, student withdrawals were assessed. The results found that distance training provided longer retention than mass training. In another study, (Mashhadi et al., 2017) explored the impact of distance and mass delivery training on memory and retention of grammar constructs by EFL learners. In the public high school, they selected 72 Iranian EFL junior high school students. The participants were randomly divided into a spaced group (n = 24), a mass group (n = 23), and a control group (n = 25). Results from repeated mixed ANOVA, one-way ANOVA and Tukey's posthoc analysis revealed that the spatial distribution group performed much better on the delayed post-test than the other two groups. Even in the direct post evaluation, there was no substantial difference between the distance and mass distribution groups. The impact of teaching mass and spacing on vocabulary retention and retention is currently being explored by (Namaziandost et al., 2020). They concluded that in both direct and delayed mail measurements, remote distribution groups outperformed mass distribution groups.

In the Indonesian context, there are very few studies on the effect of teaching space and mass on learning performance. In particular, experimental studies that directly investigate the impact on language skills and sub-skills of large and spatiated delivery orders are both few and yet undertaken in the Indonesian context. Therefore, this study attempts to compare the effects of spaced and mass

instruction on learning outcomes among Indonesian education learners. Therefore, this study seeks to answer the following research questions:

RQ. Does spatial instruction have a significant effect on the learning outcomes of Indonesian education students?

RQ2. Does mass instruction have a significant effect on learning outcomes among Indonesian education students?

## 2. Method

### 2.1 Participants

The participants of this study were two complete classes (64 language learners) at the Faculty of Education, State University of Malang, Indonesia. The age range of participants was 19-22 years. They are selected based on non-random sampling. One class of 32 students acts as a distance instruction class, and another class of 32 students acts as a mass instruction class. Both classes are taught by the same instructor who is the author of this paper.

### 2.2 Instruments

The first instrument used in this study was the researcher-made pre-test. In order to realize participants' current knowledge of educational skills, researcher-made pre-tests were designed based on student material. It was a test of 40 objective items including multiple choice, short answer, and true or false items. The validity of the pre-test was confirmed by 5 experts. It is worth mentioning that the reliability index of the pre-test was calculated using the KR-21 formula (r = 0.88).

The second instrument of this study was a post-test of educational skills. After treatment, a post-test was designed and administered to the participants. Like the pre-test, it includes 40 objective items including multiple choice, short answer, and true or false items. The validity of the post-test was confirmed by 5 experts and the reliability index was calculated using the KR-21 formula (r = 0.93).

### 2.3 Procedure

In conducting this research, the researcher attended the aforementioned universities and chose two complete classes, namely Indonesian Language Education. The researcher selected 64 students and divided them randomly into two experimental groups; Group A (distance instructions) (n = 32) and Group B (Massed instructions) (n = 32). Then, both groups were subjected to a pre-test. After that, the participants in the experimental group ended up getting the same treatment, albeit in different ways. With distance instruction and mass instruction, the selected material was taught to the experimental class. In mass class, each text is taught to students for 90 minutes. Indeed, each session is allocated 90 minutes. In distance classes, 90 minutes are divided into 330 minutes, each session lasting 30 minutes. Space classes are held three days a week but once a week mass classes are held. Each text was instructed in an intense 90-minute session during the treatment phase, while the distance group was taught in three short sessions (approximately 90 minutes total). The first session lasted 30 minutes; the second session lasts 2 days after the first session (30 minutes), and the third session lasts 30 minutes and occurs two days after the second session. The treatment lasted 15 sessions of 90 minutes each under the guidance of the researcher. Finally, to ensure the effectiveness of the instruction and to assess students' knowledge of educational skills during the study, a post-test was carried out.

### 2.4 Data Analysis

After gathering the needed data through the aforesaid procedures, the data were analyzed and interpreted according to the objectives of the study. The data were analyzed with the help of the

Statistical Package for Social Science (SPSS) software. In data analysis, the descriptive statistics including means and standard deviation were calculated. Finally, to examine the effects of the treatment on improving the participants' Education skills, an independent samples t-test and paired samples t-test were used.

## 3. Results

To analyze the collected data, it is first necessary to check the data normality distribution. Thus, the Kolmogorov-Smirnov Test was run.

Table 1:
*One-Sample Kolmogorov-Smirnov Test (Groups' Pre and Post-tests)*

| | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|
| | Statistic | df | Sig. |
| Spacing. Pretest | .197 | 32 | .069 |
| Spacing. Posttest | .191 | 32 | .098 |
| Massed. Pretest | .261 | 32 | .119 |
| Massed. Posttest | .279 | 32 | .223 |

Table 1 shows that the score statistic is normal (p> .05). This is as a result of using SPSS 25. In this case, parametric statistics such as independent and paired sample t-tests can be used to obtain the final result.

Table 2:
*Group Statistics (Pre-test of Both Groups)*

| | Groups | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pre-test | Spacing | 32 | 12.03 | 1.35 | .23 |
| | Massed | 32 | 12.46 | 1.88 | .33 |

Table 2 depicts the descriptive statistics of the two groups on the baseline test. Based on the table above, the mass instruction group average score was 12.46 and the space instruction group average score was 12.03. As shown in the table, the two groups performed almost the same on the baseline test. Their average score is testimony to our claim.

Table 3:
Independent Samples T-test (Pre-test of *Both Groups)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | |
|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
| Pretest | Equal variances assumed | 10.16 | .00 | -1,06 | 62 | .29 | -.43 | .41 |
| | Equal variances not assumed | | | -1,06 | 56.32 | .29 | -.43 | .41 |

An independent sample t-test was purposely performed to check whether there was a significant difference between the group mean scores at pre-test. Since the Sig (.29) is greater than 0.05, the difference between the groups involved is not significant at (p <0.05). As a result, both groups did the same thing in the initial test.

Table 4:
*Group Statistics (Post-test of Both Groups)*

| | Groups | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Post-test | Spacing | 32 | 15.90 | 1.08 | .19 |
| | Massed | 32 | 12.81 | 2.07 | .36 |

Table 4 shows the post-test descriptive statistics of the two groups. The mean score of the participants in the space group was (15.90). The mean score of the participants in the bulk group was (12.81). In terms of the mean scores between the two groups, a significant difference was observed. To confirm this difference, an independent sample t-test was performed (Table 5).

Table 5:
*Independent Samples T-test (the Post-test of Both Groups)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | |
|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
| Post-test | Equal variances assumed | 28.76 | .00 | 7.48 | 62 | .00 | 3.09 | .41 |
| | Equal variances not assumed | | | 7.48 | 46.91 | .00 | 3.09 | .41 |

Table 5 shows the post-test score analysis of the two groups. Since Sig. (0.00) less than 0.05, the difference between groups was significant at (p <0.05). It can be claimed that the treatment affected group performance in the post-test. In fact, the space group outperformed the mass group on the post-test.

**Table 6:**
*Paired Samples Statistics (Pre and Post-tests of Both Groups)*

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Posttest-Spacing | 15.90 | 32 | 1.08 | .19 |
| | Pretest-Spacing | 12.03 | 32 | 1.35 | .23 |
| Pair 2 | Posttest-Massed | 12.81 | 32 | 2.07 | .36 |
| | Pretest-Massed | 12.46 | 32 | 1.88 | .33 |

Based on the descriptive statistics in the table above, the mean scores of the mass groups on the pre-test and post-test were 1.46 and 12.81, respectively. The mean scores of the distance group on the pre and post-test were 12.03 and 15.90, respectively. To ascertain the difference between the pre-test and the post-test of each group, paired sample t-tests were performed in the following table.

Table 7:

*Paired Samples T-test (Pre and Post-tests of Both Groups)*

| | | Mean | Std. Deviation | Std. Error Mean | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| Pair 1 | Post. Sapacing-Pre. Spacing | 3.87 | 1.64 | .29 | 13.35 | 31 | .00 |
| Pair 2 | Post. Massed-Pre. Massed | .34 | .90 | .15 | 2.15 | 31 | .08 |

In the table above, paired sample t-tests were used to compare the initial and final tests of each group. Since the Sig (.06) is greater than 0.05, the difference between the post-test and pre-test of the mass group was not significant. In addition, because the Sig (.000) is smaller than 0.05, the difference between the post-test and pre-test of the group spacing is significant.

## 4. Discussion

This study aims to see and analyse the effect of Profitability, Leverage, Liquidity, Size, and Company Growth on Dividend Payout Ratio in the Indonesian capital market 2013-2018. The population of this research is 525 companies from all sectors listed on the IDX except for the financial sector. By using a purposive sampling method of sampling, the number obtained is 10 companies. The data testing method used is multiple linear regression analysis. Based on the results of research simultaneously that the variables profitability, leverage, liquidity, size and company growth together do not affect the dividend payout ratio, while partially profitability, leverage, liquidity, company size do not affect the dividend payout ratio, while the company growth variable has an effect significant negative to the dividend payout ratio. After collecting data, researchers used paired and separate t-tests to research them in order to determine the effectiveness of treatment on student achievement. The results showed that compared to students who received mass training, students who received distance training had better performance. The findings statistically indicated that the spacing group performed much better than the mass group ($p < 0.05$).

The results showed that spacing training strengthened the learning outcomes of Indonesian education students. The results are consistent with previous cognitive psychology experiments (Seabrook et al., 2005) that verify the impact of the spatial distribution of teaching across various learning disciplines. In addition, these findings also validate several types of previous research (for example, (SW Miles, 2014); (S. Miles & Kwon, 2008); (Rohrer & Pashler, 2010)) which show that language learning improves in the spatial distribution of exercises.

Therefore, content learning through spatial learning is better than mass learning. This finding is also consistent with cognitive science research (eg, (Carpenter et al., 2009)) and international language acquisition studies (SW Miles, 2014), which have shown the dominance of distance training environments in driving lifetime acquisition of the impact of time. In line with this, (S. W. Miles, 2014) stated that in the instant and delayed posttest, the distance distribution group performed better than the control group and the mass distribution group. In addition, (Pavlik Jr & Anderson, 2005) and also (Rohrer & Pashler, 2010) suggested that distance training sessions are beneficial for long-term memory, whereas spatial and mass objects appear to be similar to direct memory. As reported by Miles (2014),

One of the advantages of remote delivery training is that it gives students a greater opportunity to retain sufficient information obtained from instruction before the next opportunity for analysis occurs,

either accidentally through feedback, in particular through additional teaching, or through the need to use items. in language skills (p. 421).

According to the coding principle of heterogeneity, the more distant two objects are, the more likely they will be represented separately in the mind of the learner (Anderson & Bower, 1972). Further retrieval signals are generated by this inconsistency of memory representations, made possible by the various environments in which distant objects appear. Therefore, in distributed delivery instructions, withdrawals take precedence. In addition, due to the lack of a storage principle, the first demonstration was not available in the interval at the time of the second demonstration, therefore complete processing of the second presentation was required (Jacoby, 1978). Consequently, this principle, in effect, encourages learning and retention. As a result, if respondents are worn with two objects at the same time or for a short time, they do not pay much attention to the two objects as if they were given sufficient space.

This research has worldly realism that is stronger than previous studies. That is, we create a situation where the material taught at the secondary level is equivalent to an actual educational environment. For example, attracting students' attention both to the context and nature of the material, practicing the material cooperatively by students, asking students to repeat the material after initial introduction and before learning in pairs, etc. examined the effects of distance on the learning of educational skills using instructional resources with traditional learning exercises provided in the context of practical learning and with academically appropriate periods.

One of the salient general reasons for mass ineffectiveness is that students pay less attention to this interval when dealing with mass intervals (Hintzman, 1974; Cepeda et al., 2006). Reduced consideration will not only jeopardize the learning of relevant teaching points (coherent with the verbal learning framework) to clarify the existing shortcomings associated with mass training but will also strengthen notification of the relationship of changes in output as a result of changes in input parameters for mass combinations. However, it is not entirely clear from the descriptions of consciousness that it detracts from how destructive strategic mass records relational information found in pairs, rather than making this relational information more popular.

Another explanation is that the mass (learning partner) itself does not raise awareness of the essential characteristics needed to enable learners to participate in the comparative hypothesis for most students. Design models that tend to facilitate comparative hypotheses are where stimulus pairs are simultaneously introduced and in which the respondent determines which of the two stimuli provides the greater (or lesser) threshold value (Pachur & Olsson, 2012). Mass training clearly does not require simultaneous demonstrations; However, a fairly perfect response during training indicates that the pairing of stimuli is simultaneously reflected in working memory. It seems, therefore, more likely that mass is counterproductive because it does not in itself activate the comparative hypothesis necessary for studying relational knowledge, in the absence of clear instructions for distinguishing stimuli. Despite this, aggregation may have compelled learners to employ comparative techniques, since their success during testing may not have been enhanced by attempts to do so.

The current research extends to previous research that through paper pencil activities at the learning stage, students in our study did not practice skills. For example, Goossens et al. (2012) have children use fill-in tests, true / false questions, and multiple-choice questions for learning. We use reliable and valid operations in our research; That is, we train students and collect terms in learning sessions cooperatively. Apart from that, we also attract students' attention both in terms of form and meaning of terms. In most of the previous studies, students' attention was focused on the meaning of the content at the time of the research. Teaching and learning practices in our study were largely similar to actual classroom practices.

## 5. Conclusion

In short, the research findings revealed that distance instruction resulted in better learning than mass instruction. The results showed that because of distance training, the distance group was more successful on the post-test. It can be concluded from the results obtained that learning with spaced distribution instructions gives students a greater opportunity to retain adequate information obtained from instruction before the next opportunity for analysis occurs, either accidentally through input,

deliberately through additional training, or through necessity. to utilize the same content in the language learning process (Miles (2014, p. 421).

In everyday activities, distances are usually available, where familiarity with a combination of cue criteria is divided by several times (for example, comparing the advantages of watering grass with the strength of the sun during watering; the volume of traffic jams at the time of day) and where people generate forecasts for decision making . However, educators and instructional technologists should counteract standard experiences and instincts in an instructional environment, preferring mass demonstrations and analysis, and perhaps suggesting spatial preparation (requiring answer generation) to facilitate learning of principles and tasks (Kornell & Bjork, 2008). Our findings also highlight that teachers definitely need to reconsider the reinforcement of the mass versus distance factor illustrated in laboratory studies with appropriate strategies for raising comparative hypotheses that should encourage learning (Etemadfar, Namaziandost, & Banari, 2019). Simultaneous representation of teaching stimuli, involving comparative reactions (Pachur & Olsson, 2012), and parallelization of education and extrapolation trials are potential recommendations for future action. (Bott & Heit, 2004).

The results of this research can offer useful assistance in a number of ways to students, educators, and programmers. In order to increase the amount of their learning, students must spread out their period of self-study in due course. For instructors, it may be a good idea to plan classroom assignments according to a staggered plan to increase student success during exams. It will also help curriculum developers and program designers to prepare course books and promote learning foreign vocabulary through them. Because distance has a reinforcing impact on students' long-term memory (Cepeda et al., 2006), syllabus designers and curriculum creators may have the ability to determine when in a course and where in a book material needs to be repeated.

The application of spatial learning provides many benefits for the academic field of foreign language learning. Through the use of spatial instruction students can learn effectively with more confidence. The findings of this study suggest that English learners should consciously use spatial instructions to manage their performance and to sustain their learning. The findings from this study will encourage teachers to teach their students through spatial instruction because this type of instruction is more useful than mass instruction. This discovery could help English teachers whether to use distance instruction or mass instruction. With the knowledge gained from this study, it will be possible for L2 educators, researchers, and curriculum planners to gain insight into how to facilitate teaching English part of speech through the use of spatial instruction and mass instruction.

During the course of this study, the researcher found several limitations. Due to time constraints, only 64 respondents participated in this study. This research was conducted on male students and female students were not included. Another limitation is the apparently short duration of treatment. Research is limited to Indonesian students; it can be done in other EFL and ESL settings. The current study was conducted in whole classes in Indonesia, so the findings should be generalized to all language learners with extreme caution. Another limitation is that this study only included participants aged 19 to 22 years. So, the results cannot be generalized to other age groups.

## 6. Recommendation

During conducting this research, several recommendations came to the minds of the researchers. The first recommendation for future studies is to include more participants for a more understandable result. A second recommendation for future study is to work at different language proficiency levels - elementary, secondary and advanced. The third suggestion for further learning on the same topic is to pay attention to gender, meaning that both male and female students must be involved. The fourth suggestion is that further studies be recommended to undertake similar topics in

other geographic areas. Finally, future research is offered to examine the effects of mass and spatial instruction on educational skills and sub-skills.

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