

The Correlation Between Concept Gaining And Retention In PQ4R, TPS, And PQ4R-TPS Learning Strategies

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ABSTRACT

Concept gaining and retention are two important things in learning. Concept gaining is the knowledge the students gain after they follow a learning process. While retention is the ability to remember concepts within a certain period of time on the material being taught. This research aimed at exploring the correlation between concept gaining and retention of the students who learned by using PQ4R, TPS, and PQ4R-TPS learning strategies, and comparing the regression lines related, whether they were parallel or not. The results of this reseazrch showed that there was a significant correlation between concept gaining and retention in all the three learning strategies. The highest contribution value was detected at TPS, followed by PQ4R-TPS, and PQ4R strategy. The results of further analysis reveal that the biggest slope or the rate of students' retention in relation with the concept gaining is found at the TPS learning strategy. This fact indicates that the biggest potential of the increase of students' retention due to concept gaining is found at the TPS learning strategy. In other words, TPS learning is the most effective learning strategy in empowering students' concept gaining and retention compared to the two other learning strategy. Nonetheless, PQ4R and PQ4R-TPS learning strategies also have the potential to empower students' concept gaining and retention, that can be seen at the contribution of each learning strategy. This information is valuable for teachers in implementing appropriate learning strategies to improve students' concept gaining because it is believed to have an effect on students' retention.

Key words: concept gaining, learning strategies, PQ4R, regression lines, retention, TPS

INTRODUCTION

Meaningful learning is seen as an important educational goal. Corebima (2006) stated that the result of meaningful learning would be potentially meaningful, both related to cognitive, affective and psychomotor aspects. The achievement of learning objectives can be seen from the students' learning results. However, the more commonly highlighted learning results as an indicator of the achievement of learning results are related to cognitive aspect (concept gaining). Cognitive learning results would be more meaningful if it can be stored in long term memory (retention).

Concept gaining and retention are two important things in learning. Concept gaining is the knowledge acquired by the students after they attend the learning process. Anderson & Kratwohl (2001) stated that concept gaining was the integration of knowledge dimension and

cognitive process dimension. While learning retention is related to how much knowledge which can be stored in long term memory and can be retrieved after a particular time interval (Rose, 2007).

Learning using various strategies (models) can help to achieve the more meaningful learning objectives. According to Corebima (2016), learning in secondary schools and in universities should be based on learning models. In this case, the high school teachers should select and use a wide variety of innovative learning models which have been popular nowadays.

Students' learning and their achievement are influenced by various factors, such as learning strategies and environmental impact (Schmid & Borner, 2015). Some researchers believe that the use of ineffective strategies is one of the causes of unsuccessful learning. Nurochma, et al. (2012), stated that one of the factors having an important role in learning was the use of appropriate learning strategies.

PQ4R learning strategy (*Preview Question Read Reflect Recite Review*) is one of the strategies that can be applied to meaningful learning. Bibi and Manzoor (2011) stated that this *PQ4R* strategy was one of the learning strategies that have been proven to be useful in-depth understanding and reconstructive learning. *PQ4R* learning strategy encourages good and correct reading activities and helps students to establish a comprehensive understanding. A comprehensive understanding will relatively last longer be stored in the brain rather than just the ability to memorize facts (Wahyuningsih, 2012). *PQ4R* learning strategy is potential in empowering retention. *PQ4R* strategy is an elaboration strategy that helps to transfer new information from short-term memory into long-term memory by creating associations and connections between the new information and the previous information already known (Nur, 2000).

In addition to the *PQ4R* strategy, *TPS* (*Think Pair Share*) learning strategy is also proven to help learners achieving meaningful learning. According to Widodo (2011), *TPS* strategy gives students the chance to hone their thinking ability and ultimately gives meaningful knowledge stored in their long term memory or retention. Joyce et al. (2009) stated that *TPS* learning was ideal for teachers and students who were just learning collaboration. *TPS* learning strategy gives students the opportunity to work independently and collaboratively with others and can optimize the students' participation.

There are only few researches investigating the correlation between concept gaining and retention using different learning strategies. However, the few researches investigating the correlation used the concept gaining and retention variables which was correlated independently with other variables, such as metacognitive skills, critical thinking, or motivation. The results of those research showed a strong correlation among those variables through the learning strategies implemented.

Basith (2011) reported that there was a correlation between metacognitive skills and learning results on the implementation of *TPS* learning strategy with the contribution value of 82.4%. Similarly, Chikmiyah and Sugiarto (2012) reported a significant correlation between metacognitive skills and learning results through *TPS* learning model with a correlation coefficient of 0.809. These researches prove that *TPS* learning potentially improves not only students' learning results, but also students' retention.

Palennari (2016) also reported that there was a significant correlation between metacognitive skills and cognitive retention in some learning strategies studied. Bahri and Corebima (2015) stated that there was a correlation between learning motivation and metacognitive skills on cognitive learning results in some learning strategies studied. Bahri study (2016) showed that metacognitive skills had a correlation with students' retention. Struyven et al. (2006) reported too that there was a strong correlation between depth approach to learning and learning results. Furthermore Poondej and Lerdpornkulrat (2016) also reported that there was a strong correlation between depth approach and motivation, with learning results making students wanted to search and to understand the meaning of the learning materials rather than trying to memorize only what they have learned; they associated the new ideas with the existing knowledge, leading to an understanding and long-term retention.

Right now there is not any information yet about the correlation between concept gaining and cognitive retention in different learning strategies of biology learning, namely PQ4R, TPS, PQ4R-TPS, in senior high school. It is believed that the use of appropriate learning strategies can enhance the students' concept gaining and improve students' cognitive retention. The use of different Biology learning strategies can illustrate different correlations between students' concept gaining and cognitive retention. Baran and Maskan (2011) reported that there have been many reports on the correlation between variables and the other variables in different conditions and different areas of knowledge. Thus, it is also possible that there is a different correlation between students' concept gaining and their cognitive retention in a variety of learning strategies of Biology class.

This research is conducted to explore the correlation between concept gaining (posttest) and cognitive retention in three different learning strategies and to compare the three regression lines related whether they are parallel or not parallel. The results of this research can provide more relevant information for biology teachers to select appropriate learning strategies to improve students' concept gaining and cognitive retention.

METHOD

This correlational research was conducted to determine the correlation between students' biology concept gaining and retention in three different learning strategies. The three learning strategies were PQ4R, TPS, and PQ4R-TPS. In this research biology concept gaining was as predictor, and students' retention was as the criterion. This research was conducted during one semester in the first semester of 2013/2014 academic year at senior high schools in Parepare, Indonesia.

RESEARCH SAMPLES

The population of this research was all senior high school students in Pare Pare, Indonesia in the odd semester of 2013/2014 academic year consisting of 920 students. The sample of this research consisted of 240 students, who were randomly selected and spread in 3 research classes. All learning strategies were represented by 3 classes as class *PQ4R*, *TPS*, and *PQ4R-TPS*. The classes used as the research samples were based on an equality test (*placement test*) in the form of valid and reliable multiple choice test related to Biology material, of senior high school, as many as 50 numbers. The equality test analysis was done by using analysis of variance (ANOVA) using *SPSS 20 for Windows*. The results of the analysis showed that all classes were equal.

INSTRUMENTS AND PROCEDURES

The students' biology concept gaining was measured by using cognitive test in the form of essay test as many as 15 items developed by researchers. This test was also used to measure students' retention. The rubric used was the rubric of cognitive learning results adapted from Hart (1994), consisting of five scales (0-4). The instruments were validated by experts and empirically validated. The results of the expert validation and empirical validation showed that the instruments were valid and reliable. Test of concept gaining was given after the learning process (posttest), and retention test was given 2 weeks after the posttest (Hicks, et al., 2000; Mbotto, et al., 2011; Duyilemi and Bolajoko, 2014).

DATA ANALYSIS

Hypothesis testing was done after it was assured that the data was normally distributed and homogeneous. Simple linear regression was used to analyze the correlation between biology concept gaining and retention on each learning strategy. Analysis of variance was used to determine the parallelism and intersection of the regression lines, and also to know which strategy showing the highest correlation between students' biology concept gaining and retention. Data were analyzed using SPSS 20.

RESEARCH RESULT

This research explores the single correlation between students' concept gaining and retention in biology class. The results of the regression analysis on the correlation between students' concept gaining and retention in the implementation of PQ4R strategy are presented in Table 1.

Table 1. Summary of Anova on the Correlation between Students' Concept Gaining and Retention in the Implementation of PQ4R Strategy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6730.874	1	6730.874	202.587	0,000 ^b
	residual	1196.083	36	33.225		
	Total	7926.958	37			

- a. Dependent Variable: YRETPQ4R
- b. Predictors: (Constant), XHBPQ4R

Summary of the correlation analysis results between students' concept gaining and retention in the implementation of PQ4R strategy is presented in Table 2.

Table 2. Summary of the Correlation Analysis Result between Students' Concept Gaining and Retention in the Implementation of PQ4R Strategy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,921 ^a	,849	,845	5.76407

- a. Predictors: (Constant), XHBPQ4R

The results of the regression test between students' concept gaining and retention (Table 1) show that the F value is 202.587 with significance value of 0.000 ($p < 0.05$). Thus, it is clearly seen that there is a correlation between students' concept gaining and retention in the implementation of PQ4R strategy.

The correlation coefficient (r) obtained is 0.921 which can be interpreted that the correlation between students' concept gaining and retention on the implementation of PQ4R strategy is strong. The contribution value of students' concept gaining on retention related is 84.9%.

The results of the regression analysis on the correlation between students' concept gaining and retention in the implementation of TPS strategy are presented in Table 3.

Table 3. Summary of Anova on the Correlation between Students' Concept Gaining and Retention in the Implementation of TPS Strategy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9248.629	1	9248.629	502.312	0,000 ^b
	residual	699.661	38	18.412		
	Total	9948.290	39			

- a. Dependent Variable: YRETTTPS
b. Predictors: (Constant), XHBTPS

Summary of the correlation analysis results between students' concept gaining and retention in the implementation of TPS strategy is presented in Table 4.

Table 4. Summary of the Correlation Analysis Results between Concept Gaining and Retention in the Implementation of TPS Strategy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,964 ^a	,930	,928	4.29093

- a. Predictors: (Constant), XHBTPS

The results of the regression test between students' concept gaining and retention (Table 3) show that the F value is 502.312 with the significance value of 0.000 ($p < 0.05$). Thus, it is clearly seen that there is a correlation between concept gaining and retention in the implementation of TPS strategy.

The correlation coefficient (r) obtained is 0,964 which can be interpreted that the correlation between students' concept gaining and retention on the implementation of TPS strategy is strong. The contribution value of students concept gaining on retention related is 93.0%.

The results of the regression analysis on the correlation between concept gaining and retention in the implementation of PQ4R-TPS strategy are presented in Table 5.

Table 5. Summary of Anova on the Correlation between Students' Concept Gaining and Retention in the Implementation of PQ4R-TPS Strategy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5408.937	1	5408.937	350.361	0,000 ^b
	residual	555.775	36	15.438		
	Total	5964.712	37			

- a. Dependent Variable: YRETPQ4R TPS
b. Predictors: (Constant), XHBTPQ4R TPS

Summary of the correlation analysis results between concept gaining and retention in the implementation of PQ4R-TPS strategy is presented in Table 6.

Table 6. Summary of the Correlation Analysis Results between Students Concept Gaining and Retention on the Implementation of PQ4R-TPS Strategy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,952 ^a	,907	,904	3.92915

a. Predictors: (Constant), XHBPQ4R-TPS

The results of the regression test between students' concept gaining and retention (Table 5) show that the F value is 350.361 with the significance value of 0.000 ($p < 0.05$). Thus, it is clearly seen that there is a correlation between students' concept gaining and retention in the implementation of PQ4R-TPS strategy.

The correlation coefficient (r) obtained is 0.952 which can be interpreted that the correlation between students' concept gaining and retention on the implementation of PQ4R-TPS strategy is strong. The contribution value of students' concept gaining on retention related is 90.7%.

Summary of analysis results of regression equation test of anova on the correlation between students' concept gaining and retention in the three learning strategies is shown in Table 7.

Table 7. Summary of Anova on the Correlation Regression Equation between Concept Gaining and Retention at the Three Learning Strategies (PQ4R, TPS, PQ4R-TPS)

Model		Sum of Squares	df	Mean Square	F	Sign.
1	Regression	22677.082	5	4535.416	203.505	0,000 ^b
	b1, b2	549.5236436	2	274.7618	12.3286	0,000
	b1, b2, b3	657.5149583	4	164.3787	7.375698	0,000
	residual	2451.519	110	22.287		
	Total	25128.601	115			

PostHB-RetHB

Result: not parallel and not coincide.

The results of ANOVA test show that the value of b1, b2 is 0.000 ($p < 0.05$), the value of b1, b2, b3 is 0.000 ($p < 0.05$). Those values prove that the regression lines related to the correlation between concept gaining and retention are not parallel to each other, and not coincide. This means that the slopes are different from one another, so is the intercept from one another. In other words, the rate of students' retention caused by the effect of concept gaining is different from one another.

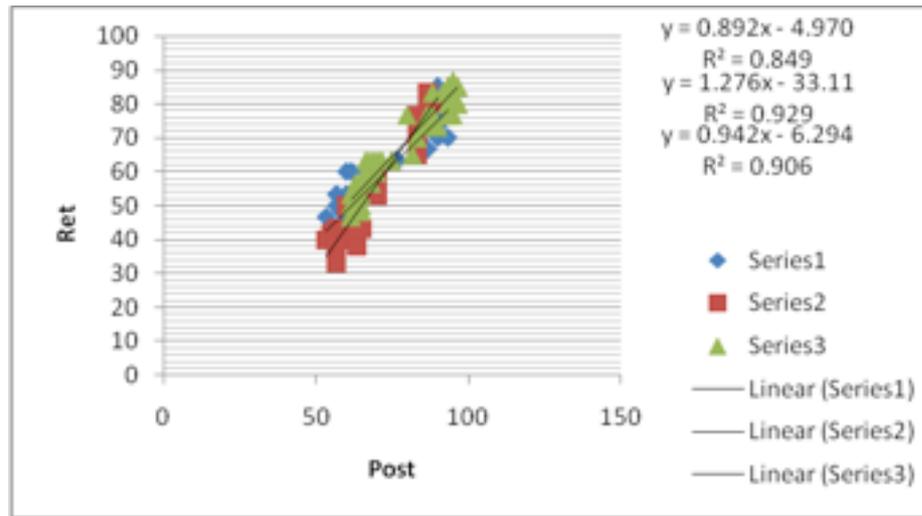


Figure 1. Regression line of concept gaining and retention at the implementation of PQ4R, TPS, PQ4R- TPS

Anova of the correlation regression equation between students' concept gaining and retention in two learning strategies (PQ4R and TPS) is shown in Table 8.

Table 8. Summary of Anova on the Correlation Regression Equation between Students' Concept Gaining and Retention at the Implementation of PQ4R and TPS Learning Strategies

Model		Sum of Squares	df	Mean Square	F	Sign.
1	Regression	16029.620	3	5343.207	208.571	0,000 ^b
	b1, b2	502.9497	1	502.9497	19.63255	0,000
	b1, b2, b3	503.0104	2	251.5052	9.817458	0,000
	residual	1895.744	74	25.618		
	Total	17925.364	77			

The results of ANOVA show that the value of b1, b2 is 0.000 ($p < 0.05$), the value of b1, b2, b3 is 0.000 ($p < 0.05$). Those values prove that the regression line related to the correlation between concept gaining and retention are not parallel to each other, and not coincide. This means that the slopes are different from one another, and so are the intercepts. In other words, the students' retention rate related to the concept gaining is different between one another, so is the magnitude of the students' retention.

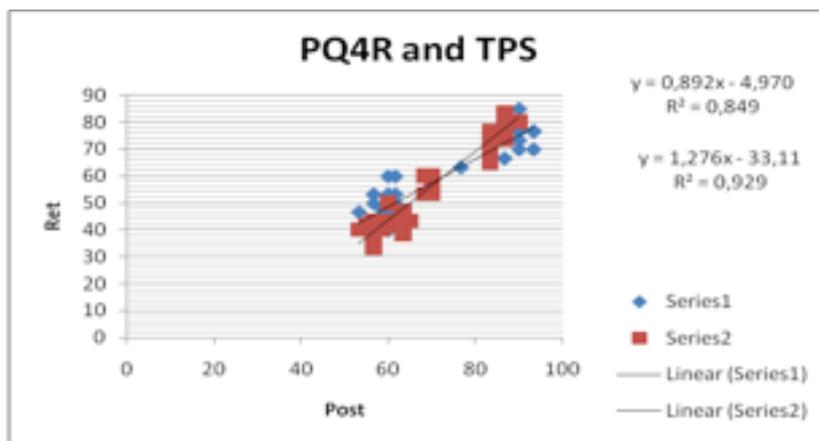


Figure 2. Regression line of concept gaining and retention at the implementation of PQ4R and TPS learning strategies

Regression equation anova related to the correlation between students' concept gaining and retention in two learning strategies (PQ4R and PQ4R-TPS) is presented in Table 9.

Table 9. Summary of Anova on the Correlation Regression Equation between Students' Concept Gaining and Retention at the Implementation of PQ4R and PQ4R-TPS Strategies

Model		Sum of Squares	df	Mean Square	F	Sign.
1	Regression	12856,042	3	4285,347	176,124	0,000 ^b
	b1,b2	8,827325	1	8,827325	0,362796	0,549
	b1,b2,b3	124,7741	2	62,38706	2,564059	0,000
	Residual	1751,858	72	24,331		
	Total	14607,900	75			

PostHB-RetHB

Result: Parallel & not coincide.

The results of ANOVA test show that the value of b1, b2 is 0.549 ($p > 0.05$), but the value of b1, b2, b3 is 0.000 ($p < 0.05$). Those values prove that the regression lines related to the correlation between concept gaining and retention are parallel to each other, and not coincide. This means that the slopes are not different from one another, while intercepts are different from one another. In other words, the rate of students' retention related to concept gaining is not different from one another, while the students' retention related to concept gaining is different from one another.

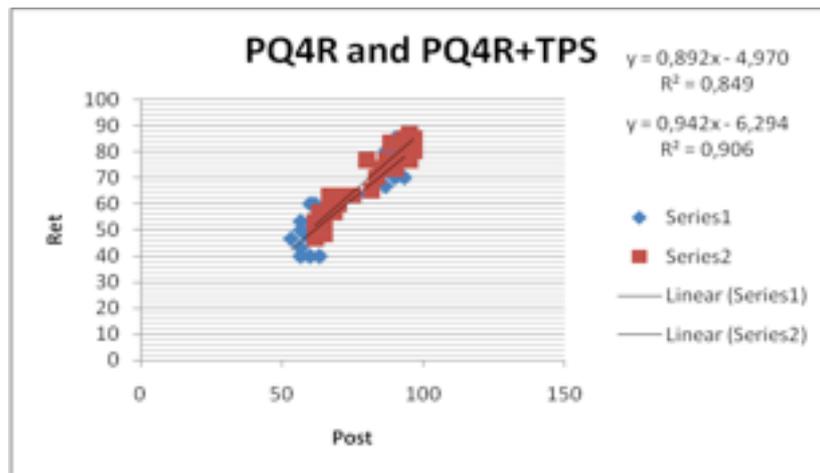


Figure 3. Regression line of concept gaining and retention at the implementation of PQ4R and PQ4R-TPS strategy

Anova of the correlation regression equation between students' concept gaining and retention in two learning strategies (TPS and PQ4R-TPS) is presented in Table 10.

Table 10. Summary of Anova on the Correlation Regression Equation between Students' Concept Gaining and Retention at the Implementation of TPS and PQ4R-TPS Learning Strategies

Model		Sum of Squares	df	Mean Square	F	Sign.
1	Regression	15826.025	3	5275.342	310.948	0,000 ^b
	b1, b2	329.6644	1	329.6644	19.43164	0,000
	b1, b2, b3	376.494	2	188.247	11.09597	0,000
	residual	1255.435	74	16.965		
	Total	17081.460	77			

PostHB-RetHB

Result: not parallel and not coincide.

The results of ANOVA show that the value of b1, b2 is 0.000 ($p < 0.05$), and the value of b1, b2, b3 is 0.000 ($p < 0.05$). Those values prove that the regression lines related to the correlation between concept gaining and retention are not parallel to each other, and not coincide. This means that the slopes are different from one another, and so are the intercepts. In other words, the rate of students' retention related to the concept gaining is different from one another, and so is the magnitude of the students' retention.

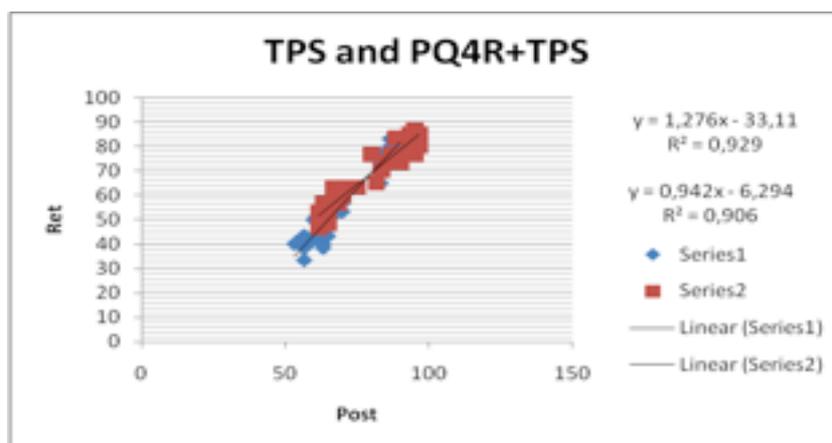


Figure 4. The correlation regression line of concept gaining and retention at the implementation of TPS and PQ4R-TPS

DISCUSSION

The Correlation between Students' Concept Gaining and Retention on PQ4R, TPS, and PQ4R-TPS Learning Strategies

The results of this research show that there is a correlation between concept gaining and retention in the PQ4R, TPS, PQ4R-TPS strategies. The results of data analysis also show that there is a positive value of the correlation coefficient in the three learning strategies. It means that the increase of students concept gaining score is always followed by an increase in students' retention. The implication of these findings is that the empowerment of students' retention through the implementation of PQ4R, TPS, PQ4R-TPS can be done because concept gaining has a contribution on students' retention.

This fact is in line with the statement by Logsdon (2007) and Rodli (2015) that each stage of *PQ4R* strategy encouraged students to use their thinking skills and comprehension. *PQ4R* strategy has a syntax which consists of six steps, namely *Preview*, *Question*, *Read*, *Reflect*, *Recite*, *Review* which gradually directs students to understand the concepts and information storage.

The *Preview* stage, as the initial stage of this strategy, is the stage where the students read the learning material quickly through planning and prediction skills. According to Bibi and Manzoor (2011), through *previews*, the students already had an idea of the things being learned.

Question stage is a stage where the students formulate questions developed from a simple question to a complex question. Besides, students also formulate questions using the previously related knowledge (Logsdon, 2007) that encourages students to think at a higher level (Rogers, 2006).

The reading activity at the *read* stage is a reading activity in more detail and comprehensive on reading material aimed at finding answers to questions that have been formulated (Logsdon, 2007). This reading is the process of thinking (Khattack & Khan, 2002) because in reading we do not only read the text, but also try to understand what we read (Leipzig, 2001).

During the reading, students must do reflection. This activity encourages the development of students' horizons because students try to understand what they are reading by connecting their reading with their prior knowledge, linking sub topics with concepts, and connecting what they read with the reality (Logsdon, 2007).

The next activity is *recite* or questioning and answering by themselves. This stage involves the students' thinking skills to recap the information that has been understood, and then they formulate concepts, explain the relationship between these concepts, and write back with their own editorial (Huber, 2004).

The final activity of *PQ4R* strategy is *review*. Logsdon (2007) stated that the students' activity at this stage is making a summary of the information that has been understood. This activity encourages students to think by reviewing the understanding of the material. Six stages of *PQ4R* strategy have developed students' concept understanding. This activity is carried out in a systematic way, so that it enables a good process of memory storages or a good retention. According to Nur (2000), *PQ4R* strategy was a strategy helping to transfer the elaboration of new information from short-term memory into long-term memory by creating a connection between the new information with the previous information already known.

Similarly, the *TPS* strategy has procedures that allow students to think, discuss, and share with other students (Miranda, 2010). According to Kennedy (2007), *TPS* strategy encouraged all students to be active in the classroom through writing, thinking, listening and speaking skills. Similarly Stuever (2006) stated that the activities in the *TPS* strategy made students to discover their thoughts, to write about what they think, and to compare their ideas with other students. When students give their conclusions to the class, they will retain their findings and review their ideas.

Think Pair Share strategy consists of three (3) stages, namely *thinking*, *pairing*, and *sharing* (Kennedy, 2007). *TPS* strategy gives students the chance to hone their thinking ability and ultimately gives meaningful knowledge stored in their long term memory or retention (Widodo, 2011). *TPS* strategy requires all students in the class to practice writing, thinking, listening, and speaking skills (Allen & Tanner, 2002; Ibe, 2009).

Based on its contribution, it is possible that *PQ4R-TPS* learning strategy can be used to improve students concept gaining and retention. The six steps of *PQ4R* strategy are integrated in the think stage of *TPS* strategy. Each stage in *PQ4R* learning strategy can help students to effectively memorize information from readings, activate their prior knowledge, and begin the process of making the relationship between new information and the previous information already known (Anderson, 1987). After that, the *Pair* and *Share* stages in *TPS* strategy can maximize the potential of *PQ4R* strategy in empowering students' retention through the process of thinking, participation and cooperation among students. According to Lord (2001), cooperation among students in the learning process gave a positive effect on retention.

The significant correlation between concept gaining and retention in learning strategies as uncovered in this research is supported by several previous studies. Ardilla et al. (2013) stated that there was a significant correlation between metacognitive skills and cognitive learning results of class X students in Biology learning with the implementation of *PBMP* strategy. Palennari (2016) reported that there was a correlation between metacognitive skills and retention in the *PBL*, *Jigsaw*, and *PBL-Jigsaw* learning strategies.

The Contribution of Concept Gaining toward Students' Retention in *PQ4R*, *TPS*, and *PQ4R-TPS* Strategies

This research shows that the biggest contribution of concept gaining toward retention is found in the *TPS* learning strategy, followed by that of in *PQ4R-TPS* strategy, and *PQ4R* strategy. This

suggests that the TPS learning strategy has the highest efficiency in empowering students concept gaining and retention. Nevertheless, there is a possibility that PQ4R and PQ4R-TPS learning strategies also have the potential to empower students' concept gaining and retention because the contribution of PQ4R-TPS and PQ4R strategies is also big.

The superiorities of the TPS strategy are the group activity and cooperation which are parts of the step in *TPS* strategy. That the students discussing and answering questions together in groups enables them to learn and help each other's weaknesses. Similarly, on the sharing activity, each student listens to opinions and answers to other students, and then they have a discussion in order to solve the answers to questions and can ultimately make a summary of the results of their study. According to Ofodu and Lawal (2012), one of the reasons the *TPS* strategy was able to improve students' learning results was all group members had the opportunity to interact in pairs and helped each other to understand the reading passage. Thus, the *TPS* strategy is helpful in improving students' concept gaining and retention.

THE RESULTS OF ANOVA RELATED TO REGRESSION EQUATION

The results of ANOVA test revealed that the biggest slope or the rate of students' retention in relation with the concept gaining, is found at the TPS learning strategy. This fact is in line with the contribution of concept gaining toward retention in the TPS learning strategy.

This situation shows that the biggest potential of the increase of students' retention related to the concept gaining is found at the TPS learning strategy. In other words, TPS learning is the most effective learning strategy in empowering students' concept gaining and retention compared to the two other learning strategies. Nonetheless, PQ4R and PQ4R-TPS learning strategies also have the potential to empower students' concept gaining and retention, based on the contribution of each learning strategy.

According to Carss (2007), TPS strategy had a positive effect on students' reading comprehension level. TPS helps students to have better understanding, which helps to develop their thinking and to reconstruct their new knowledge. Tanner (2009) also stated that the TPS strategy developed a classroom culture that focused on understanding.

In line with several researches related to the increase of learning results through TPS strategy, Basith (2011), Chikmiyah and Sugiarto (2012), as well as Fauziah et al. (2013), showed a significant correlation between metacognitive skills and learning results in TPS learning strategy. Ofodu and Lawal (2012) revealed a significant difference in reading comprehension in the implementation of TPS strategy.

Similarly, related to retention, Atunasikha (2010) stated that students' retention of cognitive learning results increased in the implementation of PBMP integrated with TPS strategy. Malahayati (2011) also reported that the PBL + TPS learning strategy had an effect on retention of metacognitive skills as much as 83.306% and the retention of the learning results as much as 95.029%. It is seen that the increase in metacognitive skills is followed by an increase in retention in the implementation of TPS learning strategy. According to Suratno (2009), related to students' cognitive retention, learning strategies had an effect on learning results. The same thing was also reported in the research of Warouw (2008), Jamaluddin (2009), and Zahri (2010), that concept gaining and retention are affected by learning strategies.

CONCLUSION

The results of this research show a significant correlation between students' concept gaining and retention in PQ4R, TPS, PQ4R-TPS learning strategies. The highest contribution rate is in TPS strategy, followed by that of in PQ4R-TPS strategy, and PQ4R. The results of further analysis reveal that the biggest slope or the rate of students' retention in relation with the concept gaining is found at the TPS learning strategy. This fact indicates that the biggest potential of the increase of students' retention due to concept gaining is found at the TPS learning strategy. In other words, TPS learning strategy is the most effective learning strategy in empowering students' concept gaining and retention. Nonetheless, PQ4R and PQ4R-TPS also have the potential to empower students' concept gaining and retention, which appear in the value of the contribution of each learning strategy.

SUGGESTION

The implications of this research indicate that teachers can implement TPS or PQ4R-TPS and PQ4R learning strategies in biology class to improve students' concept gaining and retention. This information is valuable for teachers in implementing appropriate learning strategies to improve concept gaining because it is believed to have an effect on students' retention.

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