

Exploring Factors that Correlate to Student Pre-Service Teacher Retention in RQA Learning Models

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ABSTRACT

Retention is the key to the success of a learning program. Several studies have shown that retention can be influenced by metacognitive skills, critical thinking, cognitive learning outcomes, and applied learning models. Meanwhile, testing the relationship between the three factors mentioned above and retention is only done using simple and multiple regression with two factors. This correlational study was conducted to determine the relationship between three factors, namely metacognitive skills, critical thinking, and cognitive learning outcomes on retention in students taught by RQA and QASEE learning models, as well as conventional learning. A total of 107 pre-service teachers of Biology Education students in South Sumatra, Indonesia, were involved in this study. The results showed a relationship between metacognitive skills, critical thinking, and cognitive learning outcomes with retention in students who were taught the RQA learning model. However, in the QASEE learning model and conventional learning, this relationship was not found. Thus, it can be concluded that more than two factors affect retention. Then, applying the appropriate learning model also influences the success of a learning program. Finally, conventional learning that only emphasizes efforts to get students to pass the exam must be abandoned immediately.

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1. INTRODUCTION

The success of a learning program lies not only in how high the score is obtained after taking a test. Rather, it also lies in the learner's ability to retain information in memory for long periods. This is what has come to be known as retention (Afoan & Corebima, 2018; Bacon & Stewart, 2006). Retention is also associated with the learner's ability to retrieve information that has been stored in long-term memory

when needed (Marzano et al., 1988). Retention is important to be empowered because it can help pre-service teachers when dealing with problems whose solution requires knowledge that has been studied (Ismirawati, Corebima, Zubaidah, & Syamsuri, 2018).

Efforts to empower retention must consider a number of factors, as outlined below. Metacognitive skills are the first thing to look at. Planning, goal setting, monitoring, evaluation, and reflection are associated with metacognitive skills (Burman, Boscardin, & Van Schaik, 2014). Cognitive activities, such as memory, are heavily reliant on metacognitive abilities (Howard, 2004; Ohtani & Hisasaka, 2018). The ability to think critically is a second factor to consider. Critical thinking skills are defined as logical and rational decision-making abilities (Ennis, 1993). Critical thinking skills are also associated with objective decision-making efforts and involve in-depth assessment (D'Alessio, Avolio, & Charles, 2019). The third factor is cognitive learning outcomes. Cognitive learning outcomes can also be described as the ability to remember, understand, apply, analyze, evaluate, and create (Anderson & Krathwohl, 2001).

In both simple linear regression and multiple linear regression with two factors, these three factors have been extensively studied for retention and are generally facilitated by certain learning models. The following are some case studies and examples of simple linear regression research and the findings. Palennari (2016), in his research, found that metacognitive skills correlated with pre-service teacher retention in PBL, Jigsaw, and PBL Jigsaw classes. Then, Setiawati & Corebima (2017) found that conceptual understanding was positively correlated with increased retention in classes taught with the PQ4R, TPS, and PQ4R-TPS learning models.

Research in multiple linear regression with two factors has been described below. Bahri (2016) found a correlation between metacognitive skills and cognitive learning outcomes on retention in his research facilitated by the PBLRQA learning model. Researchers who used the PBL learning model in their study found that metacognitive and critical thinking skills were linked to retention. There was a link between metacognitive skills and cognitive learning outcomes with retention, according to Afoan & Corebima (2018). However, interestingly, not all tests of the correlation between these three factors with retention showed positive results. The following shows how many studies in a simple linear correlation show negative results. Ardila, Corebima, & Zubaidah (2013), who uses the Thinking Empowerment by Question (TEQ) learning model, report no significant correlation between metacognitive skills and retention. The same thing was also found in Arifin, Zubaidah, & Mahanal (2013) study, which used the Reciprocal Teaching (RT) learning model.

Meanwhile, studies in multiple linear regression with two factors that reported negative results were found in the studies of Afoan & Corebima (2018) and Meko (2018). The research result of Afoan & Corebima (2018), facilitated by the learning model SQ3R and SQ3R + RQA indicates no correlation between metacognitive skills and cognitive learning outcomes with retention of learners. In even and odd semesters, research conducted by Meko (2018) also showed similar results that metacognitive skills and creative thinking skills were not correlated with retention of pre-service teachers taught with the RQA learning model. The question is whether this learning model fails to facilitate a correlation between these factors and retention? Or are there other factors that influence the outcome of the correlational study?

Pre-service teachers' competencies are considered in the design and development of every learning model. The RQA and QASEE models of education are at issue here. Reading, questioning, and answering syntax is the RQA learning model. The QASEE learning model, on the other hand, is an evolution of the RQA model. Questions are asked, answers are given, and information is shared, expanded upon, and evaluated as part of the QASEE model of education. It is possible to improve metacognitive skills, critical thinking, cognitive learning outcomes and retention using both models of learning (Saputri & Corebima, 2020; Saputri, Corebima, Susilo, & Suwono, 2020). The QASEE learning model can facilitate metacognitive skills and cognitive learning outcomes (Saputri & Corebima, 2020).

On the other hand, the problem that is also clearly seen from several studies examining the correlation that has been mentioned is that only one or two factors are involved. Meanwhile, education, particularly one variable, can be correlated with many other variables (Guilford, 1942). The dependent variable/criterion is not sufficiently explained only by one or even two variables predictor alone

(Schneider, Hommel, & Blettner, 2010). In other words, pre-service teacher retention is believed to be influenced by many factors. For example, after being researched by Bahri (2016), the contribution given by metacognitive skills and cognitive learning outcomes to retention is only 15%, and the contribution of other factors is 85%. Likewise, in Nurisya & Corebima's (2017) research, it was found that the contribution given by metacognitive skills and critical thinking skills to retention was only 37.7% and the remaining 62.3% came from other factors not studied. Meanwhile, Afoan & Corebima (2018) found that metacognitive skills and cognitive learning outcomes only contributed 33.7% to retention, while the remaining 66.3% came from factors outside the study.

Other factors indicate that the factors/other predictor variables do not seem to be considered in each of these studies. It is believed that testing of simple or multiple linear correlations alone cannot fully reveal the factors that contribute to retention. Therefore, this study will examine the correlation between metacognitive skills, critical thinking skills, and cognitive learning outcomes simultaneously towards pre-service teacher retention facilitated by RQA and QASEE learning models as well as conventional learning. The results of this study are expected to be a reference for lecturers on how to empower retention appropriately.

2. METHODS

This research is a quantitative and qualitative approach that reveals the correlation of metacognitive skills, critical thinking skills, and cognitive learning outcomes of retention after applying different learning models. The population in this study were pre-service teachers at one of the universities in Palembang city. The research sample is 107 pre-service teachers in the biology education study program who program animal ecology courses. The pre-service teachers are divided into three different classes, which have been tested for equality with a placement test. Each class received a different treatment; one class was taught using the QASEE learning model, one class was taught using the RQA learning model, and one class continued to carry out conventional learning.

Data on metacognitive skills, critical thinking skills, cognitive learning outcomes were collected by giving the same essay questions before and after treatment. Meanwhile, the retention data also used the same essay questions but were collected one week after the posttest was given. The collected data is then assessed with each rubric. Data on metacognitive skills were assessed using Corebima's (2009) rubric consisting of eight scales (0-7). Data on critical thinking skills were compared with the rubric developed by Zubaidah, Corebima, & Mistianah (2015). Then, the collected data on cognitive learning outcomes and retention were assessed using the rubric of cognitive learning outcomes with five scales (0-4). The data were analyzed statistically using multiple regression analysis. Previously, assumptions were also tested, namely normality and homogeneity tests. Data were analyzed using SPSS 20 for Windows.

3. FINDINGS AND DISCUSSION

RQA Learning Model

The regression analysis results on the correlation between metacognitive skills, critical thinking skills, and cognitive learning outcomes on retention can be seen in Tables 1, 2, and 3.

Table 1. The Summary of Anova on RQA Learning Model

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	260,418	3	86,806	4,473	,010 ^b
	Residual	621,005	32	19,406		
	Total	881,423	35			

Table 2. Coefesient of Regression

	Model	Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	39,282	11,954		3,286	,002
	MetaRQA	,438	,513	,382	,854	,399
	CriticalRQA	,295	,114	,524	2,592	,014
	CognitiveRQA	-,470	,427	-,451	-1,101	,279

Table 3. The Summary of Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,544 ^a	,295	,229	4,40527

Table 4. Relatively and Effectively of Contribution

Variable	RC(%)	EC(%)
X1 (Metacognitive) – Y (Retention)	40,71	12,03
X2 (Critical Thinking Skills) – Y (Retention)	91,64	27,07
X3 (Cognitive) – Y (Retention)	-32,35	-9,6
Total	100	29,5

Table 1 shows a significant correlation between metacognitive skills, critical thinking skills, cognitive learning outcomes, and retention in pre-service teachers the RQA learning model taught. This is known from the significance value, 0.010, smaller than 0.05. Table 2 shows the regression equation, namely $Y=0.438X_1 + 0.295X_2 - 0.470X_3 + 39.282$. Table 3 shows the R-value of 0.544. Thus, it can be concluded that metacognitive skills, critical thinking skills, and cognitive learning outcomes contributed 29.5% to the increase in retention and the remaining 70.5% probably came from other factors. Table 4 shows that the effective contribution of metacognitive skills to retention is 12.03%, while the effective contribution of critical thinking skills is 27.07%, and the effective contribution of cognitive learning outcomes is -9.6%. This study indicates that metacognitive skills, critical thinking skills, and cognitive learning outcomes correlate with retention in pre-service teachers who taught the RQA learning model with 29.5 %. Although so far, no research has been found related to multiple regression testing with three factors at once. However, there are several results of regression research on testing the correlation of one or two factors with retention that support this research, including (Afoan & Corebima, 2018; Nurisya & Corebima, 2017; Palennari, 2016)

QASEE Learning Model

The regression analysis results on the correlation between metacognitive skills, critical thinking skills, and cognitive learning outcomes on retention in the QASEE learning model can be seen in Table 5.

Table 5. The Summary Anova on QASEE Learning Model

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	59,976	3	19,992	1,135	,349 ^b
Residual	599,099	34	17,621		
Total	659,075	37			

Different from RQA learning model, Table 5 shows no significant correlation between metacognitive skills, critical thinking skills, cognitive learning outcomes, and retention in pre-service teachers taught by the QASEE learning model. This is known from the significance value, which is 0.349 greater than α 0.05. Whereas both metacognitive skills, critical thinking skills, and correlated and retention cognitive learning outcomes can be improved by applying learning models. Metacognitive skills can be improved through learning that invites pre-service teachers to evaluate and monitor their learning process and then affect the increased information stored in memory. When individuals monitor their learning, they can decide to continue learning other materials or repeat subject matter that has not been understood. This includes deciding on strategies, resources, and time needed to learn (Schwartz, Son, Kornell, & Finn, 2011). Metacognitive skills can help individuals monitor memory and make decisions based on monitoring results. However, suppose an individual does not have good metacognitive skills. In that case, the individual will not recognize himself and his learning accurately, and this fails to choose the right learning strategy to improve long-term memory (McCabe, 2011).

Critical thinking skills can be empowered through learning activities that encourage pre-service teachers to ask questions (Sasson, Yehuda, & Malkinson, 2018). In addition, each individual can improve critical thinking skills through social dialogue in small groups, which includes them in various cognitive activities such as explaining, criticizing, debating, clarifying, and collaborating (Kim, Sharma, Land, & Furlong, 2013). Strong critical thinking skills allow pre-service teachers to develop deeper and more accurate understandings so that they can be retained in the brain for a longer period, which will affect memory (Nurisya & Corebima, 2017). Critical thinking skills are also reported to help increase the acquisition of correct knowledge and concepts. This certainly cannot be separated from the role of critical thinking skills in considering different points of view to make the best decisions based on careful, systematic, and rational efforts (Hidayati, Zubaidah, Suarsini, & Praherdhiono, 2020).

Monitoring activities, asking questions, and discussions are already included in the syntax of the RQA and QASEE learning models. RQA is a learning model that emphasizes reading activities followed by questioning and answering activities. In reading activities, pre-service teachers are asked to read the material and summarize what they have read. Then, in the questioning activity, pre-service teachers are directed to make some questions based on the summary made. In the last activity, in answering activities, pre-service teachers are encouraged to answer questions that have been made themselves. All these activities are carried out independently before entering class. In class, pre-service teachers are facilitated to present the results of the summary, questions, and answers made. A series of activities have been proven to make pre-service teachers more ready to take part in learning. RQA has been extensively researched for its superiority in improving metacognitive skills (Corebima & Bahri, 2011), critical thinking skills (Sudin, Duda, & Supiandi, 2018), and cognitive learning outcomes (Bahri & Corebima, 2015), and long-term memory (Palennari, 2016). Although in Meko's (2018) research, RQA failed to bridge the correlation between metacognitive skills and creative thinking skills with learner retention.

Then, the QASEE learning model consists of Questioning, Answering, Sharing, Extending, and Evaluating activities. Pre-service teachers are asked to make some questions related to the material to be studied in the questioning activity. Meanwhile, in answering activities, pre-service teachers are directed to answer questions that have been made previously. Activity questioning and answering are done individually at home to help each learner have sufficient knowledge capital to participate in the class. In sharing activities, pre-service teachers are allowed to discuss questions and answers that have been made before being presented. In extending activities, pre-service teachers can apply the knowledge they have acquired in previous activities in new contexts. Lastly, the activities of evaluating the learners are invited for the recall of knowledge successfully mastered along the way, reveal failures in nature, and write an improvement plan that will be pursued. The results of (Saputri & Corebima's, 2020) research show that the QASEE learning model can facilitate the correlation between metacognitive skills and cognitive learning outcomes. The research results of Saputri et al. (2020) also

reported that the QASEE learning model could be a means to improve pre-service teachers' critical thinking skills.

Conventional Learning

The regression analysis results on the correlation between metacognitive skills, critical thinking skills, and cognitive learning outcomes on pre-service teacher retention in the QASEE learning model can be seen in Table 6.

Table 6. Summary of Anova on Conventional Learning

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	130,095	3	43,365	2,298	,098 ^b
	Residual	547,241	29	18,870		
	Total	677,336	32			

Table 6 illustrates no significant correlation between metacognitive skills, critical thinking skills, cognitive learning outcomes, and retention in pre-service teachers taught with conventional learning. This is known from the significance value, 0.098 greater than 0.05. Conventional learning in this study is described as a type of learning that emphasizes memorization oriented towards efforts to pass the exam alone. This learning also facilitates pre-service teachers to discuss and present the discussion results. However, it is still dominated by the lecture method. The goal is also for pre-service teachers to understand the material as much as possible, not for developing metacognitive and critical thinking skills. As a result, pre-service teachers become less active and get bored quickly. This kind of learning has been widely reported to have no impact on metacognitive skills, critical thinking skills, cognitive learning, and retention of learners (Afoan & Corebima, 2018; Omwirhiren, 2015; Zubaidah et al., 2018).

The learning process, which is still oriented towards passing exams, is believed to cause (Sele, Corebima, & Indriwati, 2016). Retention is related to retaining information (Bacon & Stewart, 2006). The process of storing information certainly can not be separated from the memory system. The human memory system is divided into three parts: sensory memory, short-term memory (working memory), and long-term memory (Slavin, 2006). The register sensory (sensory memory) will accept the entered information to be interpreted (perception). Register memory can receive much information but can only hold him in a short time interval, just in a split second before it is lost (forgot) or switched to the memory of work (working memory). Because it is, giving attention to any information that is entered is important to do. Working memory, also known as short-term memory, is a temporary information storage area and can hold information for about 15 seconds for seven items (Chang, Kinshuk, Chen, & Yu, 2012). When the information is in the memory of work, information on long-term memory also is activated to be combined with information new. Processing information also must be immediately done and do it repeatedly (rehearsal) so not lost (forgot) and encoded (coding) (Slavin, 2006). If processing, the information goes to the well and then is stored in the long term memory.

However, the information processing system cannot be separated from interference which ultimately causes pre-service teachers to forget the material they have just learned easily. (Anderson, 2000) stated that other causes of forgetfulness, namely damage/decomposition (decay). According to the decay theory, the breakdown process can lead to spontaneous memory loss. The information stored in the memory can further weaken or fade, so difficult to be taken back from memory and even will disappear along with time for information that is not or rarely used. Because it is, pre-service teachers should always be trying to do the repetition (rehearsal) or retrieval to ensure that the materials lesson has been saved with both the memory of run length and can be used at any time if needed (Agarwal, Finley, Rose, & Roediger, 2017). This result is also presented by Shing & Brod (2016), which summarizes the two principles of the ability to remember, namely the availability of knowledge beginning that provide structure for the entry of knowledge of the new and the ability to access the knowledge

beginning that right. Thus, having prior knowledge is not sufficient but must be accompanied by the ability to access it. The pre-service teacher owns the ability and willingness to access and repeat the material learned that has already been tested here are believed to be still low. Jones et al. (2015) find that as many as 600 pre-service teachers of science biology in five universities in the UK have a low memory of the material concept of basic biology. Afoan & Corebima (2018) mentions that pre-service teachers tend only to study when they are about to take an exam and not repeat the material. Grnaz (2020) reported that as many as 42.6% of learners' purpose is to obtain a good score. If they get a good score, they feel no need anymore for knowledge gained. Whereas, if the subject continues to be repeated, it will give an advantage to anyone who studied it.

Thus, pre-service teachers need to change the learning pattern that is not to pass the exam but also so that knowledge can be stored in the memory of term length and can be accessed. Meanwhile, on the part of educators, it is hoped that they can continue to innovate by applying certain learning models that can hone pre-service teachers' thinking skills. Suppose educators always involve pre-service teachers in thinking activities, including solving the problem. In that case, the pre-service teacher is believed to not only will get good retention but also achieve higher cognitive levels.

4. CONCLUSION

Retention is a reflection of the success of a learning program and the key to the success of further learning. Based on the research that has been done, information is obtained that there is a correlation between metacognitive skills, critical thinking skills, and cognitive learning outcomes correlated with retention in pre-service teachers who are taught with the RQA learning model with a contribution of 29.5 %. However, unfortunately, not found a correlation between the three variables mentioned with the retention of the pre-service teachers is taught by the QASEE learning model. So far, learning carried out by pre-service teachers and lecturers still tends to be dominated by efforts to succeed in exams by ignoring the retention of subject matter. Therefore, lecturers should pay attention to their teaching practices by placing more emphasis on developing thinking skills that have an impact on improving long-term memory and the other factors that influence retention by using appropriate learning models.

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