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THE CONTRIBUTION OF LEARNING MOTIVATION AND METACOGNITIVE SKILL ON COGNITIVE LEARNING OUTCOME OF STUDENTS WITHIN DIFFERENT LEARNING STRATEGIES

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Abstract. *The study of the correlation between learning motivation and metacognitive skill on students' cognitive learning outcome simultaneously in classes taught by different learning strategies is still lacking. A correlational research was conducted to investigate the contribution of learning motivation and metacognitive skill simultaneously on cognitive learning outcome of 142 students studying biology in classes experiencing different learning strategies at Faculty of Mathematics and Natural Science, State University of Makassar, Indonesia. The learning motivation was measured by using motivation questionnaire adapted from Keller (1983), and metacognitive skill was measured integrated with cognitive test. The findings showed that contribution of learning motivation and metacognitive skills simultaneously on cognitive learning outcomes in PBL-RQA, PBL, RQA, and conventional learning strategies was very high. The contribution of metacognitive skills on cognitive learning outcome was much greater than the contribution of learning motivation. This finding research was contrary with the previous studies. Based on the facts related to metacognitive skills, learning should consider seriously the empowerment of metacognitive skills by implementing appropriate learning strategies. Further researches are needed to reveal the correlation between learning motivation on cognitive learning outcomes in different populations and measuring instruments.*
Key words: *biology cognitive learning outcome, learning motivation, metacognitive skill, problem-based learning, problem-based learning-reading questioning and answering.*

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Introduction

Motivation explains the reason why people do a particular thing, makes them keep doing it, and helps them to finish the task. A motivation concept is used to explain an individual's desire to behave, behaviour direction, behaviour intensity, and a real accomplishment or a real achievement (Pintrich, 2003). Koesoema (2009) stated that someone's change depended on his/her motivation to involve in the change process itself. Learning motivation focuses on a cognitive response, such as a propensity of students to achieve meaningful and useful academic activity and to obtain benefits from the activity (Santrock, 2007; Brophy, 2004). Students, who have learning motivation, will pay careful attention to the lesson, read material so they can understand the content and use various supported learning strategies. Besides, students also will involve in learning activities, have a curiosity, find related sources to comprehend a particular topic, and accomplish the given assignments.

Learning motivation is considered as another factor that influences more to the learning final outcome other than learning arrangement (Paris, et al., 1983). Rehman (2013) stated that students' learning outcome might be improved by motivating them. Motivation can be said as an intrinsic function as well as an extrinsic factor. The intrinsic factor is individual's interest of field learnt and orientation to take classes, while the extrinsic factor is related to the lecturers, the heaviness of the courses, the learning methods, and other lecture conditions and facilities. When students have strong intrinsic motivation to do a certain activity, then the extrinsic factors can be coped. It also means that the locus of control of an individual is more dominant than the self-internal factor (Winkel, 2004). Santrock (2007) stated that extrinsic motivation was a way to reach goals. The extrinsic motivation is frequently influenced by external incentives such as reward and punishment. The intrinsic motivation consists of: 1) intrinsic motivation based on self-determination and personal option, and 2) intrinsic motivation based on optimal experiences. Students' intrinsic interest might increase if they have options and the opportunity to take personal responsibility on their own

learning. On the other hand, optimal experiences mostly happen when someone fully focusses on a particular activity and is involved in the challenge faced. Brophy (2004) suggested that there were five factors that might affect students' learning motivation, such as: teachers' hope, direct instruction, appropriate feedback, reinforcement, as well as reward and punishment.

Motivation design model of Keller's (1983) viewed a motivation as something that was in sequence. This model consists of four main areas: Attention, Relevance, Confidence, and Satisfaction (ARCS). Driscoll (1994) and Smith (2008) explained that a lecturer could get and maintain students' attention by providing learning environment that could arouse and create students' curiosity. Keller & Suzuki (2004) stated that students' attention could be emerged by using various learning strategies, media, and materials. It is also necessary for learners to perceive the instructional requirements to be consistent with their goals, compatible with their learning styles and connected to their past experiences. It could help students to get relevance for their learning (Driscoll, 1994, Keller & Suzuki, 2004, and Hodges, 2004). A lecturer could make students feel confident with their learning by dividing the complex objectives into simpler ones, that is, easier to be achieved, convince students that they could finish their assigned tasks if they were facilitated (Driscoll, 1994), and help students to establish positive expectancies for success (Keller & Suzuki, 2004). Students could get satisfaction through the motivational strategy such as verbal reinforcement, reward and personal attention given timely, and relevant feedback (Keller & Suzuki, 2004).

Beside motivation, metacognitive skill is considered playing an important role in many types of cognitive activity, including comprehension. The activation of metacognitive skill might create a self-regulated learner and might affect to the improvement of learning outcome. Metacognitive skill is one of the aspects of knowledge dimension and an interesting skill to be studied further.

Metacognition is a term introduced by Flavell (1976) and is interpreted as a knowledge of cognitive process. Metacognition is closely related to cognitive learning outcome. Wellman (1985) stated that metacognition is a form of cognition or second level or more thinking process that includes cognitive activity control. Thus, metacognition can be said as one's thought of self-thinking or one's cognition of self-cognition. In addition, metacognition involves an individual's knowledge and awareness of her/his cognitive activities related to the cognitive activities (Schoenfeld, 1992; and Sukarnan, 2005).

Metacognition is people's thinking awareness of her/his thinking process, whether on what she/he knows or what she/he does not. Metacognition has two components, namely: (1) metacognitive knowledge and (2) metacognitive skill. A metacognitive knowledge is highly related to someone's declarative, procedural, and conditional knowledge on solving problems (Brown & DeLoache, 1978; Veenman, 2006), while metacognitive skill is highly related to prediction skill, planning skill, monitoring skill, and evaluation skill (Moore, 2004).

O'Neil & Brown (1997) suggested that metacognition was a thinking about thinking in the sense of building a certain strategy to solve a problem. Metacognition refers to students' skill to monitor their learning process consciously (Peters, 2000). Anderson & Kathwohl (2001) added that metacognitive knowledge was cognition about cognition, which generally was similar to awareness and cognition about people's self-cognition. Therefore, it can be said that metacognition is an awareness of what is known and unknown. While metacognitive strategy refers to how people improve their awareness of thinking and learning process so people can plan, monitor, and evaluate what is learnt.

A study of Keiichi (2000) revealed several findings, such as: (1) metacognition played an important role in problem-solving activity; (2) students tended to be more skilful in solving problems, if they have metacognitive knowledge; (3) within a problem-solving framework, teachers often stressed a certain strategy to solve an issue instead of noticing the other important aspects of problem-solving activities; (4) teachers tended to express some moderate level achievements, which are important in reasoning and problem-posing strategy.

Hacker (2009) stated that metacognition allows people to take charge of their own learning. It involves awareness of how they learn, an evaluation of their learning needs, generating strategies to meet these needs and then implementing the strategies. Metacognition leads to the ability of high order thinking involving active control of a particular cognitive process in learning. Some activities like planning how to complete a given assignment, to monitor comprehension, and to evaluate cognitive development, belong to metacognitive activities in daily life. Metacognitive skills helped students make a plan, follow a certain progress, and monitor their own learning process (Imel, 2002).

Learning motivation and metacognitive skills of students can be improved by implementing some appropriate learning strategies. Several research findings reveal that learning motivation and metacognitive skills can be improved through the implementation of a certain learning strategy. Muhiddin (2012) showed that the integration

of Problem-Based Learning and Jigsaw cooperative learning could motivate students taking Basic Biology course so that they were able to enhance their concept understanding. Bahri's (2010) study also showed that Reading, Questioning, and Answering (RQA) learning strategy could definitely improve students' learning motivation in the Animal Physiology course. This finding also reveals that RQA strategy might improve students' cognitive learning outcome. Regarding the metacognitive skill empowerment, Sungur & Tekkaya (2006), Paidi (2008), Danial (2010), and Muhiddin (2012) reported that PBL strategy was able to activate students' metacognitive skill. On the other hand, Bahri (2010), Sumampouw (2011), and Corebima & Bahri (2011) reported that RQA strategy could activate students' metacognitive skills.

The correlation between learning motivation and cognitive learning outcome, as well as between metacognitive skill and cognitive learning outcome, has been studied. Ames & Archer (1988), for example, showed that there was a significant correlation between learning motivation and cognitive learning outcome. Tella (2007) and Lim (2009) also showed that learning motivation was closely correlated to students' learning achievement. Considering the correlation between metacognitive skill and cognitive learning outcome, studies by Coutinho (2007), Bahri (2010), Atunasikha (2010), Ardila (2013), and Mustaqim et al. (2013) showed that there was a correlation between metacognitive skill and cognitive learning outcome. Zimmerman (1990) also stated that self-regulated learning was closely correlated to learners' academic achievement. Kuntjojo (2012) and Mustaqim, et al. (2013) also proved that there was a correlation between metacognitive skill and students' learning motivation. Students having high learning motivation tend to have metacognitive strategy and tend to maintain the strategy in accomplishing the given assignment than those who have low learning motivation (Pintrich & De Groot, 1990). Similarly, Salili, Chiu, and Lai (2001) claimed that learners having high self-confidence and high learning motivation might make more effort to achieve better compared to those who are not confident and unmotivated. Tas, et al. (2012) reported that metacognition was significantly correlated with intrinsic motivation.

Referring to the results of the above studies, it is necessary to reveal the correlation between learning motivation and metacognitive skill on cognitive learning outcome of students taught by using different learning strategies. Based on the potency of PBL and RQA strategies in improving students' learning motivation and activating their metacognitive skill, then, PBL learning stages might be combined with RQA learning stages to form a new learning strategy named PBL-RQA. This integration is conducted to maximize the improvement of students' learning motivation and metacognitive skill.

Based on the multiple correlation study, the contribution of each factor might be revealed, on cognitive learning outcome, either learning motivation and metacognitive skill, as well as the simultaneous contribution of learning motivation and metacognitive skill on cognitive learning outcome. This study result might provide information to teachers and lecturers related to the appropriate learning strategy which is not only focussing on the cognitive learning outcome improvement, but also be able to improve students' learning motivation and to activate students metacognitive skills.

Methodology of Research

General Background of Research

This study was a correlational study conducted to uncover the contribution of learning motivation and metacognitive skill on cognitive learning outcome of the students in different learning strategies in Faculty of Mathematics and Science, State University of Makassar, Indonesia. In this study, learning motivation and metacognitive skill were positioned as predictors and cognitive learning outcome was positioned as a criterium. The scope of this study was the learning motivation consisting of ARCS indicators (*attention, relevance, confidence*, and *satisfaction*) of Keller (1983) and metacognitive skill on cognitive learning outcome of the students studying Basic Biology in classes experiencing different learning strategies. The learning strategies were conventional strategy, Problem-Based Learning, Reading Questioning and Answering, and PBL-RQA. This research was carried out in one semester on odd semester 2013.

Sample of Research

The sample of this study consisted of 142 students selected randomly, at first grade classrooms of Faculty of Mathematics and Science, State University of Makassar, Indonesia. The present study employed four Basic Biol-

ogy classes taught by using different learning strategies, namely conventional, RQA, PBL, and PBL-RQA learning strategies. Sample of research consisted of four classes, of Department of Biology, Chemistry, Physics, and Science. The classes sampled were firstly tested using a placement test with multiple-choice test on the senior high school level related to biological materials as much as 70 numbers. These data were analysed with analysis of variance (ANOVA) using SPSS 17.0 for Windows. The instrument of placement test was validated by expert and empirical validation. Empirical validation was conducted to determine the level of validity of the instrument. Reliability of the placement test was examined too.

Instrument and Procedures

The students' learning motivation was measured by using a motivation questionnaire adapted from ARCS (attention, relevance, confidence, and satisfaction) model of Keller (1983) as much as 36 items. The questionnaire used Likert scale consisting of 4 points scale, namely strongly agree, agree, disagree, and strongly disagree. The students' metacognitive skill was measured integrated to the students' cognitive learning outcome test by essay test, consisting of 21 numbers. The measurement of the metacognitive skill score was based on the formula , where x= metacognitive skill score, y_1= concept gaining score, and y_2= combined score of concept gaining score and metacognitive skill score. The questionnaire and essay test were given at the beginning (pretest) and end of the study (post-test). The instruments used were validated beforehand by the expert and empirical validation. Expert validation consisted of content and construct validity. Content validity is the accuracy of an instrument in terms of the content of the instruments, estimated in accordance with the curriculum. Construct validity is related to construction or science concept to be tested. Construct validity refers to the appropriateness of the results of the measuring instrument with the ability to be measured. Empirical validity was conducted on 50 students of the second grade of Faculty of Mathematics and Science, State University of Makassar, Indonesia. Reliability of the essay test was also examined. Reliability refers to the degree of test scores which are free from measurement error or an index that indicates the extent to which a measuring instrument trustworthy or reliable.

Data Analysis

The data of this study were data about students' learning motivation collected at the pre-test and post-test by the questionnaire and the score of metacognitive skill collected integrated with cognitive test by essay test. The data of the study were analysed by using multiple regression analysis to examine the correlation of the predictor and the criterium by using SPSS 17.0 for Windows program.

Results of Research

PBL-RQA Strategy

The summary of the regression analysis of the correlation between learning motivation and metacognitive skill of students on their cognitive learning outcome related to the implementation of PBL-RQA strategy is presented in Table 1 to Table 4.

Table 1 shows that the analysis of variance result is highly statistically significant (0.000), indicating that the correlation between learning motivation, metacognitive skill, and cognitive learning outcome is very strong. The B value of the two variable (motivation and metacognitive skill) is given in Table 2, and the constant is 9.021. It can be seen that the multiple regression equation is y = -0,070X1 + 0,857X2.

Table 1. The analysis of variance summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within PBL-RQA strategy.

ANOVA[b]						
	Model	Sum of Squares	df	Mean Square	F	p
1	Regression	2495.935	2	1247.967	52.017	.000a
	Residual	791.719	33	23.991		
	Total	3287.654	35			

Tabel 2. The regression coefficient of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within PBL-RQA strategy.

Coefficients[a]						
	Model	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	9.021	4.745		1.901	.066
	PBL-RQA Motivation	-.070	.170	-.036	-.414	.682
	PBL-RQA Metacognitive Skill	.857	.085	.867	10.096	.000

Table 3 shows that the R square is very high (0.759), indicating that related to PBL-RQA strategy, the effective contribution of learning motivation and metacognitive skill on cognitive learning outcome of the students is 75.9%. Therefore, beside the learning motivation and the metacognitive skill, the changes of the students' cognitive learning outcome were influenced too by other undetected factors as much as 24.1%. Table 4 shows that the metacognitive skill parameter provides an effective contribution as much as 75.48%, while the learning motivation parameter provides an effective contribution as much as 0.44% on cognitive learning outcome of the students.

Table 3. The regression summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within PBL-RQA strategy.

Model Summaryb				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.871a	.759	.745	4.89811

Table 4. The contribution of students' learning motivation and metacognitive skill on cognitive learning outcome of the students within PBL-RQA strategy.

Variable	RC (%)	EC (%)
X1 (Learning Motivation)—Y (Cognitive Learning Outcome)	0.58	0.44
X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	99.42	75.48
X1 (Learning Motivation) & X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	100.00	75.92

PBL Strategy

The regression analysis summary of the correlation between learning motivation and metacognitive skill of students on their learning outcome related to the implementation of PBL strategy is presented in Table 5 to Table 8.

Related to PBL strategy, Table 5 shows that the analysis of variance result is highly statistically significant (0.000), indicating that the correlation between learning motivation, metacognitive skill, and learning outcome is very strong. The B value of the two variable (motivation and metacognitive skill) is given in Table 6, and the constant is 4.176. It can be seen that the multiple regression equation is y = -0,031X1 + 0,903X2.

Table 5. The analysis of variance summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within PBL strategy.

ANOVA[b]						
	Model	Sum of Squares	Df	Mean Square	F	P
1	Regression	4930.288	2	2465.144	109.616	.000a
	Residual	742.136	33	22.489		
	Total	5672.424	35			

Table 6. The regression coefficient of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within PBL strategy.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	4.176	2.349		1.778	.085
	PBL Motivation	-.031	.119	-.016	-.261	.796
	PBL Metacognitive Skill	.903	.061	.934	14.751	.000

Table 7 shows that the R square is very high (0.869), indicating that related to PBL strategy the effective contribution of learning motivation and metacognitive skill on the cognitive learning outcome of the students is as much as 86.9%. Therefore, beside the learning motivation and the metacognitive skill, the changes of the students' cognitive learning outcome were influenced too by other undetected factors as much as 13.1%. Table 8 shows that the metacognitive skill parameter provides an effective contribution as much as 86.78%, while the learning motivation parameter provides an effective contribution as much as 0.13% on students' cognitive learning outcome.

Table 7. The regression summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within PBL strategy.

Model Summaryb				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.932a	.869	.861	4.74225

Table 8. The contribution of students' learning motivation and metacognitive skill on cognitive learning outcome within PBL strategy.

Variable	RC (%)	EC (%)
X1 (Learning Motivation)—Y (Cognitive Learning Outcome)	0.15	0.13
X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	99.85	86.78
X1 (Learning Motivation) & X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	100.00	86.92

RQA Strategy

The regression analysis summary of the correlation between learning motivation and metacognitive skill of students on their cognitive learning outcome related to the implementation of RQA strategy is presented in Table 9 to Table 12.

Related to RQA strategy, Table 9 shows that the analysis of variance result is highly statistically significant (0.000), indicating that the correlation between learning motivation, metacognitive skill, and learning outcome is very strong. The B value of the two variable (motivation and metacognitive skill) is given in Table 10, and the constant is 5.858. It can be seen that the multiple regression equation is y = -0,252X1 + 0,872X2.

Table 9. The analysis variance summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within RQA strategy.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	P
1	Regression	4794.119	2	2397.060	175.684	.000a
	Residual	422.696	31	13.644		
	Total	5217.088	33			

Table 10. The regression coefficient of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within RQA strategy.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	5.858	1.709		3.428	.002
	RQA Motivation	-.252	.117	-.111	-2.158	.039
	RQA Metacognitive Skill	.872	.047	.960	18.723	.000

Table 11 shows that the R square is very high (0.919), indicating that related to RQA strategy the effective contribution of learning motivation and metacognitive skill on the cognitive learning outcome of the students is as much as 91.9%. Therefore, beside the learning motivation and the metacognitive skill, the changes of the students' cognitive learning outcome were influenced too by other undetected factors as much as 8.1%. Table 12 shows that the metacognitive skill parameter provides an effective contribution as much as 91.38%, while the learning motivation parameter provides an effective contribution as much as 0.51% on cognitive learning outcome of the students.

Table 11. The regression summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within RQA strategy.

Model Summaryb				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.959a	.919	.914	3.69380

Table 12. The contribution of students' learning motivation and metacognitive skill on cognitive learning outcome within RQA strategy.

Variable	RC (%)	EC (%)
X1 (Learning Motivation)—Y (Cognitive Learning Outcome)	0.55	0.51
X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	99.45	91.38
X1 (Learning Motivation) & X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	100.00	91.89

Conventional Strategy

The summary of the regression analysis of the correlation between learning motivation and metacognitive skill of students on their cognitive learning outcome related to the implementation of conventional strategy is presented in Table 13 to Table 16.

Related to conventional strategy, Table 13 shows that the analysis of variance result is highly statistically significant (0.000), indicating that the correlation between learning motivation, metacognitive skill, and learning outcome is very strong. The B value of the two variable (motivation and metacognitive skill) is given in Table 14, and the constant is -1.488. It can be seen that the multiple regression equation is y = 0,014X1 + 1.001X2.

Table 13. The analysis of variance summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within conventional strategy.

ANOVA[b]						
	Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**P**
1	Regression	6362.476	2	3181.238	352.903	.000a
	Residual	297.478	33	9.014		
	Total	6659.954	35			

Table 14. The regression coefficient of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within conventional strategy.

Coefficientsa						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	-1.488	1.160		-1.282	.209
	Conv. Motivation	.014	.075	.007	.180	.858
	Conv. Metacognitive Skill	1.001	.038	.978	26.484	.000

Table 15 shows that the R square is very high (0.955), indicating that related to conventional strategy the effective contribution of learning motivation and metacognitive skill on the cognitive learning outcome of the students is as much as 95.5%. Therefore, beside the learning motivation and the metacognitive skill, the result of statistical analysis also shows that the changes of the students' cognitive learning outcome were influenced too by other undetected factors as much as 4.5%. Table 16 shows that the metacognitive skill parameter provides an effective contribution as much as 95.48%, while the learning motivation parameter provides an effective contribution as much as 0.05% on cognitive learning outcome of the students.

Table 15. The regression summary of the correlation between students' learning motivation and metacognitive skill on cognitive learning outcome within conventional strategy.

Model Summaryb				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.977a	.955	.953	3.00241

Table 16. The contribution of students' learning motivation and metacognitive skill on cognitive learning outcome within conventional strategy.

Variable	RC (%)	EC (%)
X1 (Learning Motivation)—Y (Cognitive Learning Outcome)	0.05	0.05
X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	99.95	95.48
X1 (Learning Motivation) & X2 (Metacognitive Skill)—Y (Cognitive Learning Outcome)	100.00	95.53

Discussion

Based on the above findings, it can be seen that a very high contribution is given by learning motivation and metacognitive skill on students' cognitive learning outcome simultaneously related to PBL-RQA, PBL, RQA, and conventional learning strategies as much as 75.92%, 86.92%, 91.89%, and 95.53% respectively. A correlational study by Pintrich & De Groot (1990) examined the correlation among motivation, self-regulated learning, and academic achievement of students. In this study, Pintrich examined students' self-efficacy, intrinsic value, anxiety test, self-regulation, learning strategy utilization, and performance. The self-efficacy and intrinsic values were positively related to the involvement of cognitive learning and performance. The regression analysis showed that related to the result size, self-regulation, self-efficacy, and anxiety test were the best predictors of the performance. The intrinsic values were not directly related to the performance, yet it was closely correlated to the self-regulation and cognitive strategy utilization, despite the previous achievement. The implications of individual differences in orientation motivation for cognitive engagement and self-regulation require other further study.

Both learning motivation and metacognitive variables are interrelated. Pintrich (1999) proposed a general framework to explain the relationship between motivation and self-regulated learning. Based on the framework, self-regulated learning might be facilitated by the adaptation of comprehension and relative ability objectives but be hindered by extrinsic objectives adoption. In addition, self-efficacy and an assignment score of positive belief which are parts of motivation can improve students' self-independency. Self-regulated learning is defined as a strategy used by students to manage their own cognition (such as the utilization of various cognitive and metacognitive strategies) as well as the implementation of resources management strategy used by students to manage their own learning. This was verified by Rad (2012) that metacognition was positively correlated to learning motivation; if a student had a high metacognitive skill, he/she would be able to improve his/her learning motivation.

Related to PBL-RQA, PBL, RQA, and conventional learning strategies, it appeared that the strong correlation between predictors simultaneously to the criteria found in conventional learning strategies compared to other learning strategies classified as innovative learning. Maybe, students are less familiar with learning strategies that demand more independence of students in learning and student involvement in the learning process. In PBL-

RQA, PBL, and RQA, students are required to be actively involved in the learning process, both individually, or in groups, for example, doing discussion. Individual tasks are authentic tasks that give a chance to help the students to prepare themselves to follow the course that they had prior knowledge required to construct knowledge, for example, in relation to the task of reading material before attending the lectures and made questions and its answers. Students seem to get used to being on their 'comfort zone' with just passively receiving an explanation from the lecturer through conventional learning strategies in general, also do not demand a lot of authentic tasks and their involvement in the learning process.

On the contrary, research of Ames and Archer (1988) reported that students, using learning strategies with challenging tasks more effectively, have a more positive attitude toward the class and have a stronger belief to success in learning. A positive attitude and stronger belief in success are the aspects of learning motivation. It is a challenge for the lecturers to familiarize the implementation of innovative strategies to empower students to study independently and to be actively involved in learning.

The research findings also revealed the contribution of each predictor learning motivation and metacognitive skills on cognitive learning outcomes of students. In this study, in the four learning strategies it is shown that contribution of learning motivation is smaller than the contribution of metacognitive skill. This is in line with the study by Busari (2013) indicated that self-regulation were the more potent contributors to students' achievement than motivation, on the contrary, the study of Utaminingsih (2012) reported that the contribution of learning motivation was higher than that of metacognitive skill on students' learning outcome. Related to the lower contribution of learning motivation on cognitive learning outcome, it is considered that maybe the learning motivation variable of Indonesian population cannot be used as a learning achievement predictor. It means that students' high learning motivation cannot guarantee their better cognitive learning outcome. Whereas, learning motivation is seen as a factor that extremely influences students' final learning outcome other than metacognition (Paris, et al., 1983), because no matter how good an individual metacognition, an individual learning will not be a success without the presence of an internal support. Learning motivation is a mental power in one's life that triggers learning activity, guarantees the sustainability of learning, and provides direction to the learning activity in order to reach the objectives (Winkel, 2004). Learning motivation involves related learning objectives and strategies in achieving the learning objectives (Brophy, 2004).

Previous study related to the correlation among students' motivational beliefs, self-regulation strategies and mathematics achievements was investigated by Mousoulides & Philippou (2005). This study focussed on three general types of motivational beliefs: self-efficacy beliefs, task value beliefs, and goal orientation. Self-efficacy beliefs refer to the students' confidence in their cognitive and learning skill in performing the task. Task value beliefs refer to students' evaluations about the importance and usefulness of the task. Goal orientation refers to concern in learning and mastering the task using self-set standards and self improvement (mastery goal orientation), and expected reward or avoiding punishment, as the main criterion for investing resources (extrinsic orientation) (Pintrich, 1999). The study result found that self-efficacy was a strong predictor of mathematics achievement and self-regulation strategies use having a moderate negative effect on achievement. It was contrary to the results of the present study.

The findings also show that the contribution of metacognitive skill on cognitive learning outcome is very high. It proved that the metacognitive skill training raises the students' awareness to learn, plans their learning, controls the learning process, evaluates the self-efficacy as learners, and reflects the learning, as well as evaluates their own strengths and weaknesses. This fact is in line with Livingston (1997) stating that metacognitive activities such as planning of assignment solving, controlling comprehension, and evaluating progress might be able to actively control students' cognitive process. A study by Amnah (2011) reported that giving exercises by using an effective metacognitive strategy might develop students' metacognitive control, hence it might also improve students' understanding and learning outcome. Listiani's (2014) study also showed, that metacognition learning model influenced students' learning outcome.

Furthermore, the low contribution of learning motivation on cognitive learning outcome showed in this study might be caused by the inappropriate measurement instrument of learning motivation that was used. In this study, the students' learning motivation was measured by using motivation questionnaire filled in by the students. Drew (2008) explained that related to an education study, data were generally obtained by using a set of instrument addressed to the students, so when there was an intervention during the data collection process, the data obtained might also be different from the real condition. This supports the findings of the previous studies such as the studies conducted by Bahri (2010) and Muhiddin (2012) showing the use of the questionnaire to measure

other variables, such as awareness and metacognitive skills was less precise. Therefore, a questionnaire should be constructed well so that the information obtained was accurate.

A higher contribution of the metacognitive skill on cognitive learning outcome compared to the learning motivation variable might also be caused by the administration of metacognitive skill measurement integrated to the measurement of cognitive learning outcome carried out by essay test. This finding is in line with Antika's (2015) finding, reporting that metacognitive skill variable had a much higher contribution on cognitive learning outcome compared to other variables measured by using questionnaires. It reveals that the administration of essay test tends to be more accurate to measure metacognitive skill than other inventories vastly used to measure metacognitive awareness and metacognitive skill variables, even though those inventories were validated before. Bahri's (2010) study showed that the utilization of such inventory to measure metacognitive awareness caused that the obtained data of students' metacognitive awareness tended to decrease after the lecture. It means that the utilization of an inventory for Indonesian population cannot record the respondents' ability accurately.

Based on the fact that a questionnaire was less accurate to measure the students' motivation, it would require a teacher creativity to design another alternative measurement tool capable of accurately recording the motivation variable. Referring to the success of the measurement of metacognitive skills of students by using essay test integrated with the cognitive achievement test replacing inventories/questionnaires, it is necessary to use an alternative measurement of students' learning motivation. On the other hand, it is difficult to measure learning motivation by using essay test as well as the measurement of metacognitive skill. Therefore, one form of measurement possible to be used is by observation. So far, the observation is more accurate to record students' attitudes than a questionnaire. Azwar (2009) stated that it was reasonable to interpret the attitude based on the behavior that appears. In other words, to determine one's attitude towards something, it can be seen through his behavior, because behavior is one indicator of the individual attitude. It should be noted that certain behaviors are sometimes deliberately revealed to conceal his true colors. Thus, the observed behavior may be able to be the attitude indicator in particular situational context, but the interpretation of the attitude should be very careful when based solely on the observation of a person's behavior revealed. Similarly with the attitude, through direct observation, it is expected that the students' motivation can be measured by observing the performance and behavior of students in the learning process, which shows their motivation in learning.

Another possible method of measurement can be done to measure students' learning motivation is through a covert measure method. This method is actually oriented back to the observation of behavior that has been said above, but the object of observation is no longer visible behavior, consciously or intentionally done by someone but reactions that occur over out the control of the person concerned (Azwar, 2009). To some extent, one's motivation can be interpreted through the observation of facial reactions, tone of voice, gestures, and several other aspects of behavior. But the observations of external behaviors like this should be interpreted with caution because there is still the possibility to obtain the wrong conclusions. Apart from anything that has been stated above, another limitation in the measurement of learning motivation by direct observation or a covert measure method is too large number of students in a class, making it difficult for lecturers in conducting surveillance for each student.

Regarding the above discussions, in addition to the use of appropriate measuring instruments, teachers also need to consider an appropriate learning strategy to be implemented. The learning strategy needs not to be focused on merely cognitive learning outcome, but also has to be able to enhance the students' learning motivation and activate the students' metacognition, both of which are important predictors of learning (Tas, et al., 2012).

Conclusions

Based on the findings and the discussions, it can be concluded that the contributions of learning motivation and metacognitive skill simultaneously are very high in PBL-RQA, PBL, RQA, and conventional learning strategies on students' cognitive learning outcome. Besides, it is identified that the contribution of metacognitive skill on students' cognitive learning outcome was higher than he contribution of learning motivation. Based on these facts, further research needs to reveal more about the relationship between learning motivation and metacognitive skills on cognitive learning outcomes in different populations and different measuring instruments. Our research result related to the contribution of students' learning motivation is not in line with other research results before. In addition, the lecturers should consider the empowerment of metacognitive skills and learning motivation of students through the application of appropriate learning strategies. This is caused because of the motivation and metacognition are important predictors of successful learning.

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