Effects of Blended-TBL
on Students' Self-Regulated Learning

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The purpose of this research is to develop Blended-TBL(Team Based Learning) model that emphasizes the active participation and teamwork of students in on-off blended learning environment, and apply it into the college course and explore whether self-regulated learning between one group pretest and posttest is different. For this, this research investigated the concept and the characteristics of Team Based Learning, and developed the Blended-TBL Model to apply it into the college course, and finally prove effects of Blended-TBL model on self-regulated learning using Motivated Strategies for Learning Questionnaire (MSLQ). The participants in this study were 57 college students. They participated in on-off blended-TBL course for 15weeks. Participants followed the content grounded and the problem solving steps in collaborative team-based learning.

This research practiced a quantitative research to find out the statistical difference of the self-regulated learning between pretest and posttest using SPSS. The result revealed that Blended-TBL students improved self-regulated learning including motivation, cognitive, metacognitive, and resource management. Based on this result, this research discussed the effects of Blended-TBL on Self-Regulated Learning and suggested the further study.

Keywords : team based learning, blended learning, self-regulated learning, collaborative learning

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Introduction

In the 21st century, digital knowledge based society has become more professional and complicated structured. And the society becomes to need more talented person who is able to solve the problems and learn fast, and who can product new knowledge with selection and management of information and materials in on line and off line environment. Besides, the society requires team spirit to manage the complex and huge task with team members. Accordingly, the college education needs to give the opportunity for the students to raise their responsibility, leadership and communication as well as knowledge, critical thinking, and creativity. And learners need team centered learning environment in which they can participate within the teams they belong to, and interact to fill their needs constantly and actively.

In today's increasing innovational environment, the team concept has been centered for the success in diverse fields including teaching and learning. Cooper and Mueck (1990) defined team- based learning as "a structured, systematic, instructional strategy in which small groups work together toward a common goal". Team-based learning has been applied in the classroom at universities world wide (Su, 2007; White, 1998; Ortega, Stanley, & Snavely, 2006; Haberyan, 2007; Thompson et. ap, 2007; Rider, Brashers, 2006; Palsoloq, Await, 2008; Kcphne-Eversmann, Eversmann, & Fischer, 2008). And these researches indicated that TBL provides many noted advantages like responsibility, motivation, communication, critical thinking, decision making skills, student centered learning, interpersonal skills and problem solving skills (Su, 2007; Ortega, Stanley, & Snavely, 2006; White, 1998; Elizabeth, Brashers, 2006). But there are few researches that suggested TBL strategies integrated with the blended learning, which supply the internet technology and create extra time and space enabling to facilitate the interaction and participation through diverse learning activities.

In other hands, the phenomenon of knowledge explosion in information based

society made the learners interact between themselves and environment synchronously and asynchronously. Accordingly, designing instructional learning environment to facilitate students' knowledge composition for learners has been attention getting. In order to react to this educational paradigm shift, the learners need to increase self-regulated learning to set the learning task and goal, and decide the appropriate strategies to achieve their goals, then monitor and evaluate their progress. That's why students' self-regulated learning is very important to make the environment not teacher centered, which delivers abstract contents and out of context, but learner centered, which suggests authentic task and anchored process, and finally gives the contextual knowledge and skill. So in this context, self-regulated learning must be considered seriously to design the learning model and systematic environment.

Education research has revealed that cognition and belief are related to academic learning, and make students be independent learners. Zimmerman (2002) defined self-regulation as the process that students use to activate and sustain their thoughts, behaviors, and emotions to reach their goals. Therefore self regulated learners continually adjust their goals and use strategies in response to changing intrapersonal, interpersonal, and contextual conditions (Sungur, Tekkaya, 2006). On the basis of that idea, researchers maintain that modeling and instruction are the essential elements which self-regulatory skills can be taught. Some researches indicate that some instructional learning models such as problem-based learning, goal-based scenario, web based learning can be used by teachers to support the development of self-regulated learning (Sungur, Tekkaya, 2006; Song, Son, 2007; Hofer, Yu, 2003). Especially there are several researches focusing on problem-solving learning, which put the responsibility on students to access information to achieve goals and to monitor understanding for enhancing self-regulated learning (Kalabulut, 2002, Paris & Paris, 2001). However there are few studies that support the effectiveness of TBL on students' self-regulation even though TBL has powerful learning strategy as much as PBL (Johnson, 2007). Given the general lack

of knowledge concerning the impact of TBL in blended environment on students' self-regulated learning, this research will investigate the effects of blended-TBL on self-regulated learning in college course.

Therefore, the purpose of this research is to develop blended-TBL model that emphasizes course content, active participation and teamwork in on-off blended environment, and apply it into the college course and finally explore the difference of self-regulated learning between the pretest and posttest. For this, this research will investigate concept and characteristics of TBL, develop blended-TBL model, apply it into the college course, and finally prove effects of blended-TBL model on students' self-regulated learning.

Theoretical Background

Self-regulated learning

Recently, the concept of learning has shifted from teacher-centered to students-centered, and the conceptual relationship and the learning as a process have been much more focused than before. Hence, the students should not depend on teacher for learning, instead, they should be independent learners. Many educational researches reveal that belief and cognition are highly related to academic learning and this viewpoint shows how important self-regulated learning is (Sungur & Tekkaya, 2006). The self-regulated learning is defined as the degree to which students metacognitively, motivationally, and behaviorally participate in their learning process. Accordingly, self-regulated students set plans with belief and use learning strategies effectively to achieve the goals. That perspective indicates that developing self-regulatory learning and motivating students in school is very important, and they should be emphasized because if students do not motivate themselves to use self-regulatory skills, self-regulatory learning and motivation is

little valued, and finally it would bring the result of low academic performance achieved.

The self-motivational belief is self-efficacy, outcome expectations, intrinsic interest or value, and goal orientation. Research findings reveal that Self-efficacy affects the learners' ability to use cognitive and metacognitive strategies to perform the hard tasks. And intrinsic value and goal orientation are closely related to students' reasons for performing a task (Pintrich & Degroot, 1990; Sungur & Tekkaya, 2006).

Researchers have suggested that modeling and instruction are the methods through which self-regulatory skills can be taught (Zimmerman, 2002; Sungur & Tekkaya, 2006). For an instance, problem-based learning(PBL) can be used to develop self-regulated learning, because PBL put much responsibility on students to set the goal, plan and access information, monitor students' understanding to achieve goal. However, there are little researches, which prove TBL (team-based learning) could be the instruction through which the self-regulatory skills can be developed. Jenifer Kreie (2007) and colleagues revealed that in TBL environment, the students participate actively, got more motivated, discuss and figure out things more actively, and students' engagement increased and higher quality communication achieved. Therefore, in TBL classes, students could interact with others and learning environment, and construct their own knowledge monitoring their understanding. And as students apply learning concept to their real life problems, they have ownership of the problem, and learning occurs as a result of considering the problem and finding information and suggesting solutions with monitoring themselves. During this procedure, metacognitive process is occurred while students solve the problems interacting with the environment and social negation.

Team-based learning

In today's increasingly dynamic environment, the team concept has been the

most essential element for success in the field of university education as well as business and society. The university education has been required the innovational learning method and environment that could give the opportunity of the problem solving and collaborative learning to raise the talented employee equipped not just with professional knowledge, creativity, problem solving, and critical thinking but also with leadership, team work and responsibility. A team can be defined as "formed for collective resources (eg.. knowledge, skills, and diverse expertise) are required to complete and solve complex tasks" (Johnson, 2007). Michaelsen, Knight and Fink(2002) defined TBL as "a special strategy designed to support the team to produce the maximized product and supply the opportunity to take the meaningful learning task".

In the literature, different terms such as group learning, cooperative learning, collaborative learning all share the same definition with TBL (Michaelsn, Knight and Fink, 2002). But Michaelsen (2009) proposed that TBL is more than just using group activities, it is somewhat different than collaborative and cooperate learning approach even though those three concept has the same goal of facilitating learning more actively and effectively. So to say, TBL emphasizes transformative use of groups, which "calls for procedures supporting the transformation of newly formed groups into high performance learning teams" (Johnson, 2007). TBL is based on the four principles like the following. First, team should be formed properly rather than randomly selected. Secondly, students must be responsible for their individual work and team work. Thirdly team assignment must increase group participation and interaction. Finally, feedback should be provided on individual and team assignment frequently and promptly (Jenifer Kreie, Headricks, Steiner, 2007).

TBL has improved educational outcomes in medicine, education, business and psychology courses (Thompson et. al, 2007; Goldberg, Dintzis, 2007; Haberyan, 2007; Ortega, Stanley, & Snavely, 2006; White, 1998; Vasan, 2007). Education research indicated that TBL enhances students' communication skill, group interaction skill, and comprehesion of complex course concepts (White, 1998).

Michaelsen (2008) maintains two important concepts of TBL. First, TBL is not an alternative of independent small group activity but a special instructional strategy. Secondly, TBL is focusing on team development considering it as a unit of society that is pretty different from general groups. Orgata, Stanley and Smavely (2006) also mentioned the effect of TBL on the field of medical education that it allows students to focus on the understanding how apply concepts and theories into the real world problem, as opposed to just learning about them. And team participation encourages ownership, responsibility and motivation.

TBL model

Current major journals introduced TBL, which has the three part sequenced set of learning activities consist of a preparation phase, an application phase, and an assessment phase (Michaelsen, Knight, Fink 2002). Later Johnson and others divided the application phase differently like the table 1 shows: readiness assurance and application of course concept (Johnson, 2007), IRAT and application activities (Thompson and colleagues, 2007), Readiness assurance phase and application phase (Orgata, Stanley, Smavely, 2006). This research collected four models and made the final integrated TBL model, which has three phases such as advanced learning, readiness assurance/feedback, application/problem solving, and self/peer/team evaluation.

In the advanced learning, learners read and study the unit and the material independently outside class. During the readiness assurance/feedback, learners take an individual readiness assurance test(IRAT) to estimate their understanding of concepts and contents included in reading assignment. After IRAT, pre organized teams of 5-6 learners take the same group readiness assurance test (GRAT). The tests are graded in class and the feedback and the instruction is provided immediately. During application/problem solving, teams apply the content to the real world problem situation and try to solve complex problems and make predictions and solutions. Each team compares the solutions with the other teams,

share with the entire class, and the instructor provides feedbacks. In this phase, the students can learn how to apply the course contents to real life problems. The final phase is the self/peer/team evaluation, in which learners evaluate the contribution of themselves, peers within their team and other teams.

Table 1. TBL Models

Phase	Michaelsen (2004)	Johnson(2007)	Thompson and colleagues(2007)	Orgata, Stanley and Smavely(2006)	Integrated Model (Park, 2008)
1	Preparation	Preparation	Preparation	Preparative Phase	Advanced Learning
2	Application	Readiness Assurance	Individual Readiness Test	Readiness Assurance Phase	Readiness Assurance/ Feedback
		Application of course concepts	Application Activities	Application Phase	Application Problem Solving
3	Assessment	Assessment	Peer Evaluation		Self/Peer/Team Evaluation

According to Haberyan (2007), while group activities are used within a preexisting course structure in cooperative learning, TBL requires the instructor to reconfigure the whole course and TBL allows the instructor to facilitate effective small team learning in a large classroom setting. Thompson and colleagues (2007) also pointed out the flexibility of TBL that while an application of TBL would include all 3 phases, the method allows flexibility for instructors to use selectively 1 or more of the course or session. Table 1 shows TBL models showing the three phases of learning activities.

Blended-TBL model

This study outlines blueprint of blended-TBL model reflecting the characteristics of TBL and blended learning in collaborative learning environment. One of the

strongest points of blended learning is that it could give the opportunity of self-directed learning to anyone who needs to learn anywhere and any time. That's why blended learning has been noted as irreplaceable learning method in internet era. The profit of blended learning is that it could give supplementing environment between individual learning and team learning as it supports online self-directed learning for individual learning, and face to face group activity for social interaction(Park, Lee, & Song, 2007; Ziegler et al., 2006; Bonk, 2006; Vaughan 2007; Park, 2008). In Blended-TBL learning process, the students download and read the reading assignment, listen online lecture, discuss controversial issues on the discussion board and write reflection journal of their own learning activity on online. And they can take the readiness assurance test by individual test, team test, after that, team appeals and instructor feedback, application course, and final assessment on off line. Blended-TBL course is redesigned before the start of the school term, first organized course content, the key themes and modules, and identified the instructional goals and objectives, partition the course content into macro-units-sequence the learning activities to ensure content coverage and major unit of instruction, and design the grading system. Table 2 shows Blended-TBL module blueprint, which integrated system view (Park, 2001) and blended learning approach (Bonk, 2006) based on TBL model including reading guide, readiness assessment, application exercise, and assessment plan.

Table 2. Blended-TBL module blueprint

step	core learning task	core learning sub task	learner's core activity	facilitator's core activity & question	teaching and learning supporting system		product/ grade
					online	offline	
1. advanced learning	Reading assignment	reading assignment	reading down loaded assignment	focus on important aspects of reading	e-class 'media & material board'	text book, internet resources, journal articles	
		listening assignment	listen on line lecture	What's a new concept?	e-class 'my lecture'		
		quiz	solving quiz	What's a key	e-class		quiz score

				point of the content?	'quiz board'		
		discussion	writing essay on topic, replying on peers' essay	What's a controversial issue?	e-class 'discussion board'		essay score, reply
2. Readiness assurance	readiness assurance test	individual readiness assurance test	take a individual readiness assurance test	'IRAT' What's the important concept?		individual activity	'IRAT' score
		team readiness assurance test	take a team readiness assurance test	'TRAT' What's the important concept?		group activity	'TRAT' score
	feedback	correct answers	tests are graded	'question and answer'		individual activity	
		summarize concept and a brief	ask questions	provide instruction on the concept misunderstood		individual activity	bonus score
		appeals	ask questions	'question and answer'		individual and group activity	bonus score
3. application	real life problems application	predictions	find real life problem and solution	'brainstorming'	e-class 'media & material board'	group activity	presentation
		solve problems	find the cause of problem	'fish-bone diagram' have students make decision	e-class 'media & material board'	group activity	presentation
		create explanations	find the solution of problem	'brain writing' have students use judgment	e-class 'media & material board'	group activity	presentation
4. evaluation	self-evaluation	take a self-evaluation	add up the individual score	'evaluation sheet'		individual activity	'Self evaluation score'
	peer evaluation	take a peer evaluation	add up the individual score	'evaluation sheet'		individual activity	'peer evaluation score'
	team evaluation	take a team evaluation	add up the team score	'evaluation sheet'		individual activity	'team evaluation score'

Research Method

Research question

This research sets for the following question to analyze the effectiveness of Blended-TBL on self-regulated learning.

Is there any improvement of motivation and self-regulated strategies in the post group where the Blended-TBL model is applied?

Participants and procedure

Fifty seven undergraduate students (30males and 27 females) enrolled in an 'Understanding Christianity' participated in the study. The average age of the participants was 20. All students enrolled in this course were assigned to the experimental group.

Before class begins, the instructor organized course contents and set the goals and objectives, and sequenced the learning activities to ensure content coverage and major unit of instruction, and designed a grading system. On the first day of class, course introduction and TBL workshop was held for students' understanding, and organized heterogeneous group of 6-7 students.

For each course work, the students had to read the assignment out of class, and watch the lecture on teaching and learning system, school home page containing recommended readings and a set of discussion questions. The discussion questions were intentionally designed to cover new concept and attempted to draw from the students' experience, and have them lead to the real life controversial issues. Students write essay on the discussion board, and replied to the essays of others more than twice on each topic.

Following the advanced learning, students took the individual test and then again

with their team using an answer sheet and the immediate feedback comes after the test. Individual test helps reinforce students' memory of what they learned during their individual study, and the instructor provides feedback instruction to correct any misunderstandings. During the application phase, students completed application activities in class, and upload the related media and materials on 'media & material board' in e-class. During the assessment phase students completed peer evaluations, self evaluation and team evaluation. For each person in the group, team members provided a numerical score and written comments about that individual's contributions. If a team member was not contributing to project, the member was provided with a low numerical score. After team submitted their report they completed, they do the presentation.

Measurement tool

This research measured students' motivation and self-regulated strategies by the MSLQ, which is a self-report questionnaires developed by Pintrich and DeGroot(1990). It consists of two sections, a motivational orientation and learning strategies including cognitive, metacognitive and resource management. MSLQ includes 81 items in seven subscales ranging from 1 (not at all true of me) to 7 (very true of me). But this research chose and used 47 items in five subscales ranging from 1(not at all true of me) to 5(very true of me) covering motivation and self-regulated strategies. This research use MSLQ as pretest and posttest to students in one group before and after treatment to determine enhancement of their motivation and self-regulated strategies. It is performed by the instructor twice, on September 12th for the pretest and on December 5th for the posttest. The Cronbach α was 0.975.

Research result

Table 3 shows the descriptive statistics of students' pretest and posttest scores on motivation and self-regulated strategies of the MSLQ. The result on the effect of blended-TBL on students' motivation indicated that the posttest mean scores were statistically significant at the .05 level. That is, the mean score of the posttest is higher than that of the pretest. And the result of the effect on blended-TBL on students' learning strategies showed a statistically significant mean difference between the pretest and posttest regarding cognitive (.001 level), metacognitive (.05 level), and resource management (.001 level).

So to say, as the result of the verification between the pre group and the post group, the post group has the higher average score than the pre group. This shows that applying blended-TBL model in college course meaningfully increases students' motivation and self-regulated strategies.

This means that if the class applies blended-TBL model, students might be able to improve their self-regulated learning including motivation, cognitive, metacognitive, and resource management. Because self-regulated learning is an interaction of personal, behavioral, and environmental processes, the elements such as students' knowledge, goals, and self-observation, judgment, responsibility, which affects self-regulatory skill could be affected by blended-TBL learning environments. On the basis of this viewpoint, the learning model like PBL, TBL, and others could affect self-regulated learning. TBL increases peer interaction, improves interpersonal relationship, and develops professional skills such as communication, teamwork, decision making, leadership and valuing other team members, so it can be used by teachers to support the development of self-regulated learning.

Table 3. Research result

		Mean	N	Standard Deviation	Coefficient of correlation	t
motivation	before	44.04	57	6.843	.619	-3.246**
	after	46.75	57	7.567		
cognitive	before	33.46	57	5.234	.655	-
	after	35.39	57	5.150		3.378***
metacognitive	before	25.81	57	3.921	.598	-2.036**
	after	26.82	57	4.428		
resource management	before	48.02	57	6.064	.626	-
	after	50.89	57	7.311		3.689***

*** p<0.001 ** p<0.05

Conclusion and Discussion

This research examined the effect of blended-TBL model on students' self-regulated learning. Before the treatment, this research administered MSLQ to students of one group to determine whether the posttest is different from the pretest. The result suggested that the posttest average score is higher than the pretest average score on students' self-regulated learning. **B**lended-TBL is student-centered and self-directed learning including information seeking, problem solving, group work, and learning strategies (Johnson, 2007). Through those progresses, blended-TBL course can foster students' self-regulation learning.

It seems that blended-TBL students used cognitive strategies, such as summarizing, note taking, paraphrasing, which help them to connect new information to previous knowledge, so as to apply new concept to solve real life problems, find solutions and make decisions. TBL emphasizes application of teacher-specified knowledge to address real life problems, and this helps students

guided to problem solving discussions in teams with previously learned information. In addition, blended-TBL students used metacognitive self-regulatory skills, such as planning and monitoring. Course instructor clearly identify course content that students are to learn and students plan to come to class prepared to demonstrate their knowledge on the readiness test, first as individual and then as groups. Motivation to participate in team discussion is enhanced by preparation for class to perform well (both as individuals and as teams) on readiness assurance tests. Those learning environments made students actively participate in the learning process, be responsible for their own learning.

This result supports the research of Perry and colleagues (2002), who found the reasons that students could engage in self-regulated learning. The reasons are as follows: first, getting chances to participate in complicated activities, second, making choices that affect their learning, third, and assessing themselves and peers. In blended-TBL, students could have chance to join the concept applying activities, and should have decision making in complex situation. In those situation, support system such as brainstorming and problem solving activities helped students do questioning, clarifying, correcting, elaborating, and creating, and those elements helped students can have chance to collaborate, share the ideas, make decision, and solve problems in groups on online and off line learning environment. While students discuss and listen to their peers in groups, they revised their ideas and realized deficiencies in their thought that was a metacongitive process that helped students reflect on their thinking, and finally increased self-regulated learning.

The results revealed that blended-TBL increased the self-regulated learning in college students. Therefore, it is recommended for instructors to use blended-TBL to enhance students' academic performance, not just delivering course contents but having students get responsibilities for reading assignment, problem solving, information finding, collaborating with members, monitoring their understanding, and self/peer evaluation.

For the further research, the investigation of the effect of blended-TBL on students' academic achievement and social performance such as leadership, communication, decision making, and problem solving should be examined. The experimental research between traditional class and blended-TBL class, and between blended-TBL class and face to face-TBL class on self-regulated learning should be examined. Finally this research suggests that the effects of other student-centered learning models such as action learning, creative problem solving also need to be examined on self-regulated learning.

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