ISBN 978-979-796-264-7

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INTERNATIONAL CONFERENCE ON LESSON STUDY
UNIVERSITY OF MUHAMMADIYAH MALANG

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2nd - 5th November 2016

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International Conference On Lesson Study University of Muhammadiyah Malang

Penerbit Universitas Muhammadiyah Malang

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Penerbit Universitas Muhammadiyah Malang
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Anggota APPTI (Asosiasi Penerbit Perguruan Tinggi Indonesia)

Cetakan Pertama, Juni 2017

ISBN : 978-979-796-264-7

xiv; 347 hlm.; 21 x 29,7 cm

Desain Cover & Layout : Septian R.
Editor : Nur Widodo

Sanksi Pelanggaran Pasal 113
Undang-Undang Nomor 28 Tahun 2014
tentang Hak Cipta

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KATA PENGANTAR

Alhamdulillah akhirnya Prosiding ICLS ke 7 dapat terwujud. Ucapan terimakasih yang sebesarbesarnya kami sampaikan kepada semua pihak yang telah berkonstribusi dalam mewujudkan prosiding ini. Semoga prosiding ini mampu memberikan gambaran perkembangan mutakhir implementasi *Lesson Study* di Indonesia.

Prosiding ini memuat sebagian besar *full paper* peserta dan telah dipresentasikan pada ICLS di Universitas Muhammadiyah Malang. Ruang lingkup makalah yang terhimpun cukup luas, meliputi aspek kebijakan *Lesson Study*, praktek *Lesson Study*, evaluasi pelaksanaan *Lesson Study* hingga perkembangan implementasi *Lesson Study* di berbagai sekolah.

Perkembangan *Lesson Study* di berbagai Negara mengarah pada madzhab *Lesoon Study for Learning Community*. Kehadiran prof. Manabu Sato, tokoh penting *Lesson Study for Learning Community* pada ICLS di UMM ini membawa angin segar untuk perkembangan *Lesson Study* ke depan khususnya bagi para pegiat *Lesson Study* di Indonesia.

Tiada gading yang tak retak, demikian kata pepatah. Oleh karenanya, setiap kekurangan yang terjadi dalam pelaksanaan ICLS dan perwujudan prosiding ini, kami mohon maaf yang setulusnya. Teriring harapan para kontribusi dan peserta ICLS ke 7 di Universitas Muhammadiyah Malang.

Terimakasih

Ketua Panitia

Nurwidodo

KATA SAMBUTAN

Dekan FKIP
Universitas Muhammadiyah Malang

Alhamdulillah Panitia ICLS ke 7 Universitas Muhammadiyah Malang telah berhasil menyelenggarakan agenda tahunan ASLI dan sekaligus seminar Internasional di FKIP UMM. ICLS ke 7 di UMM ini istimewa karena dilengkapi dengan Colloquium Pendidikan yang merupakan agenda "ngunduh karya ilmiah doctor baru" yang suda hmenjadi tradisi di FKIP UMM.

Suatu kebahagian bagi kami karena kinerja Panitia ICLS UMM tersebut telah disempurnakan dengan penerbitan Prosiding ICLS yang memuat karya ilmiah dari para peserta ICLS.

Terimakasih yang sebesar-besarnya saya sampaikan kepada seluruh panitia, peserta dan para pendukung yang telah menyelenggarakan ICLS UMM ini dengan sukses.

Semoga *good practices* yang terbentuk dari penyelenggaraan ICLS dan kolokium pendidikan ini bermanfaat bagi banyak pihak dan dapat ditularkan untuk kepentingan peningkatan kualitas pembelajaran dan pendidikan, khususnya di Indonesia.

Dekan FKIP

Dr. Poncojari Wahyono, M.Kes.

DAFTAR ISI

IMPROVING THE QUALITY OF LEARNING TOOLS WITH GROUP INVESTIGATION COMBINED THINK TALK WRITE (GITTW) STRATEGY THROUGH OF 'LESSON STUDY' IN BIOLOGY CLASSROOM

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Abstract: Conventional strategies such as lectures, discussion and exercises, still dominated the pattern of biology learning at schools in Surabaya, Indonesia. The strategy was not optimal in achieving of quality learning. Learning strategy is one of aspects that determines success of learning process. The new learning strategy, Group Investigation combined Think Talk Write (GITTW) with learning tools believed can increase quality learning. The Implementation of 'lesson study', learning tools with GITTW strategy can improved to quality, so can developing the students' cognitive ability. This study was qualitative descriptive approach that aimed to improve quality learning tools with GITTW strategy to optimal learning process. The research subjects were 32 students of class X natural science in the 1st half of 2014/2015 academic year Muhammadiyah 2 senior high school in Surabaya, Indonesia. The data collection techinque was observation. The study was conducted in two cycles, each cycle consisted of two meetings. The results of the research showed that implementation of 'lesson study' can improve quality learning tools with GITTW strategy, so can improve learning process and empower cognitive ability. The completeness of the 'lesson study' has been carried out well, the completeness on the implementation *GITTW* strategy has already well accomplished and there the students' activity in the GITTW learning strategy already performed well. Then olso teacher's learning management ability using GITTW strategy in the first cycle and in the second cycle was categorized as good.

Keywords: group investigation, combined with talk think write (GITTW), learning tools, lesson study.

1. INTRODUCTION

Learning at all levels of education starting from the Elementary School, Junior High School, and Senior High School needs to implement the strategies which can develop students' thinking skills and cognitive skills. Thinking skills and cognitive abilities need to be developed in this 21st century. Along with the development of science and technology, the demands of 21st century education put more emphases on the quality of education. Quantitatively, the education in Indonesia is progressing, but qualitatively the education in Indonesia is still relatively low. The low quality of education can be seen from the Human Development Report Index (HDI) reported by the Board of the United Nations Development (UNDP) in 2013. On the aspect of educational achievement, Indonesia ranked 121st from 187 countries in the world. This shows that the quality of the learning process in the classroom is still low.

The low quality of learning process is also found in biology learning in several Muhammadiyah Senior High Schools in Surabaya, Indonesia. The results of a survey shows that conventional learning strategies in general dominate the learning process in Biology classroom. Conventional learning is a learning using conventional strategies such as lecturing method, discussion and exercises, commonly applied in Biology classroom. This learning strategy has not been optimal in can improve to quality of learning process. The research results also reveal that, teachers make biology test just one emphases level on remembering (C1), and understanding (C2), while the high-level capabilities such as applying (C3), analyzing (C4), evaluating (C5) and creating (C6) are still lacking (Listiana, 2014). In fact, this is showed the low quality of learning process of biology.

The low quality of learning process was probably due to factors such as (1) use of learning strategies that are less precise in developing high-level cognitive abilities; (2) learning tools designed not in accordance with the strategy used, and (3) learning tools used is also lacking in terms of validity and practicality in application. Some efforts to overcome the above problems are required, including the implementation of the appropriate learning strategies, expected to be able to develop the high-level cognitive ability. The learning

strategy believed to be able to develop and empower high-level cognitive abilities is the GI (Group Investigation) strategy. The use of GI strategy has revealed some advantages, such as the students are (a) directly involved in acquiring knowledge; (b) not only as receivers; (c) developing interpersonal intelligence; (d) creating knowledge and developing higher order thinking skills; (e) learning higher level information when learning in cooperative groups; (f) encouraging the students to achieve higher-level thinking on learning (Mitchell et al., 2008: 389).

Another learning strategy expected to be able to develop high-level cognitive abilities is TTW strategy (think talk write). The strategy introduced by Huinker and Laughlin (1996) has some advantages. The advantages are it is very adaptable to changing conditions and can be applied to all areas of study at various levels, with a very simple syntax (Ansari, 2004). Research results revealed that TTW strategy could increase the activity and Biology learning outcome (Solikhah 2009; Astohar 2010; Fatmawati, 2010). TTW strategy is a strategy that is built through thinking, speaking and writing. These activities will give the students the opportunity to develop their higher cognitive abilities.

The combination of GI and TTW strategy, referred to as GITTW, is packaged in the form of cooperative learning, a new strategy that is believed to able to develop high-level cognitive abilities that will impact students' learning results. This combination strategy starts from the weaknesses of GI and TTW strategies which become the consideration to combine both strategies. Both of these strategies are combined by integrating the syntax of TTW into each stage of the GI. This strategy trains the students to investigate a topic of real or theoretical issues, access information from various sources, observe, analyze, synthesize, present, and evaluate through the process of thinking, speaking and writing.

Appropriate learning strategies must be designed with learning tools valid and practical in its application. The learning tools with GITTW strategy developed include lesson plan, student worksheet and evaluation tools. The development of this learning tools refers to the Curriculum in 2013 with the implementation of the use of 'lesson study'. Development of the learning tools in the implementation of 'lesson study' should meet the principle among others, develop of active learning, creative, effective and innovative, and pursue the achievement of high-level cognitive abilities (Ibrohim, 2012).

Implementation of the GITTW strategy can be effectively done by implementing 'lesson study'. According to Syamsuri and Ibrahim (2011), the implementation of 'lesson study' is an effective way to improve the quality of the teaching and learning activities. This is because the fundamental emphasis of 'lesson study' is that the students who have the quality of learning and learning objectives become the major focus and concern in the classroom. In line with this, Susilo (2014) said that through 'lesson study', educators can improve the quality of learning because the educators will help the learners achieve basic competencies expected and can help develop scientific thinking habits.

Learning using 'lesson study' is implemented collaboratively, sustainably, based on the principle of collegiality, sharing knowledge, and build a learning community. A continuous implementation of 'lesson study' can improve teachers' competence and quality of teaching and learning. Therefore, one important study on 'lesson study' is a learning strategy or learning method.

This research aimed improve the quality of learning tools with strategy GITTW through 'lesson study'. The learning tools with the new strategy-based learning 'lesson study' is expected to be considered for use as a variation in learning and can be utilized to improve the quality of teaching and learning activities of students, in turn can improve the cognitive abilities of a high level.

2. METHODOLOGY OF RESEARCH

This research was qualitative descriptive approach. Implementation 'lesson study' was conducted in two cycles in which each cycle consisted of four stages: planning, implementation, observation and reflection. In each open class, 'lesson study' was conducted covering the steps of plan, do and see.

The presence of the researcher in this research was as an observer who designed the learning activities or actions carried out by a team of 'lesson study' The model teacher was the biology teacher at the school where this research was conducted. This research was conducted at Muhammadiyah Senior High School 2 Surabaya, Indonesia. The research subjects were 32 students of class X natural science in the 1st half of 2014/2015 academic

year. This research was carried out for 2 cycles in which each cycle consisted of two meetings. The topic of the learning material in the first cycle was "the scope of biology, the scientific method and the occupational safety". The learning material for the second cycle was "different levels of biodiversity and the conservation efforts of biodiversity".

The data were collected using observation. The data collected by observation techniques were (1) the data of the completion of the stages of 'lesson study'*;* (2) the data of the completeness of the learning syntax of GITTW strategies and students' activity; and (3) the data of the teacher's ability in managing the learning.

3. FINDING AND DISCUSSION

a. Research Finding

In the early stage of the research, an observation was carried out to find the problems that occurred in biology classroom and the observation of students' activity during the learning process. The next step was to make the perception of all teachers the same, therefore, a workshop on 'lesson study' was conducted. It was followed by all Biology teachers of Muhammadiyah Senior High School Surabaya. The purpose of the workshop was the understanding of 'lesson study' and learning strategies, so that the implementation ran smoothly, and to produce a valid learning tools and practical so that can be applied to improve the quality learning.

The 'lesson study' in the classroom carried out for four times each consisting plan do and see. The summary of classroom action research activities through the 'lesson study' is shown in Table 1.

Cycle 1

The planning stage *(Plan),* it was determined the learning material to be covered in the first cycle, preparing the lesson plans, students worksheets, learning materials, and the observation sheets of completeness of GITTW learning strategy, sheets of completeness of 'lesson study', sheets of the ability in managing the class. It was conducted a review and discussion of the learning material to be used. After that, the schedule of the implementation of *do* and *see* was determined.

In the stage *Do,* two meetings or two *open classes* were carried out. The first meeting discussed about "the scope of biology" with the allocation time of 2x45 minutes. The second meeting discussed about "scientific method and occupational safety". At this time, an observation of the students' learning activities, completeness of the learning and the learning management ability was carried out. The data were collected by the help of the observer. The results of the observations showed that the students' learning activities categorized as sufficient, because some indicators were not accomplished, as asking questions, noting the learning objectives, planning the procedures or how to solve problems, sharing tasks with other group members, and ouresponding to the presentations of the other groups. Most of the students have learned about the topic, only the group 2 still lacked of coordination in the group work, especially the students with the number of 30, 31 and 33. From the other groups, the students with the number of 5, 14, 19, 21, and 25 were not active in the discussion, but they were very silent.

The reflection stage *(See)* it was obtained a sufficient result, that is, the learning activities had run quite well. The model teacher gave his impression and opinion about GITTW strategy that was implemented, the strategy was quite fun because the students worked cooperatively, teachers did not do many lecturing activities. The GITTW strategy needs an explanation to the students about the syntax of GITTW strategies, so that the students did not have any difficulty. This strategy requires a considerable amount of time, especially during the discussion, so it needs a time management for each step of the syntax. The observer noted that the students, who are not active during the learning and discussion, need to be directed and guided in completing the students' worksheets, plan the procedures or how to resolve the problem and the division of the group assignments. The obstacles in the implementation of this research were the limited number of the textbooks.

Table 1. Summary of Implementation 'Lesson Study' using Learning Tools with GITTW Strategy

Cycles	*'lesson study'*	Material	Model teachers	Observer	Implementation Time		
					Plan	***do***	***See***
I	1	Scope of Biology	Martyrs Isaac Abilio Gomes, S.Pi., M.Pd.I	1. Ir.Hj.Wedyasning Wulandari, MM. 2. Rufiah, S.Pd 3. Permatasari bead, S.Pd 4. Dra. Lina Listiana, Kes	Tuesday, 12-08-2014 (12:00 to 13:00)	Wednesday, 13-08-2014 (8:30 to 10:00 a.m.)	Wednesday, 13-08-2014 (10:00 to 11:00)
	2	Scientific Method and Occupational Safety	Martyrs Isaac Abilio Gomes, S.Pi., M.Pd.I	1. Ir.Hj.Wedyasning Wulandari, MM. 2. Rufiah, S.Pd 3. Permatasari bead, S.Pd 4. Dra. Lina Listiana, Kes	Tuesday, 19-08-2014 (12:00 to 13:00)	Wednesday, 20-08-2014 (8:30 to 10:00 a.m.)	Wednesday, 20-08-2014 (10:00 to 11:00)
II	3	Biodiversity	Martyrs Isaac Abilio Gomes, S.Pi., M.Pd.I	1. Hj. Sri Suhartini, S.Pd 2. Rufiah, S.Pd 3. Istianah Hajar, S.Pd. 4. Dra. Lina Listiana, Kes.	Tuesday, 26-08-2014 (12:00 to 13:00)	Wednesday, 27-08-2014 (8:30 to 10:00 a.m.)	Wednesday, 27-08-2014 (10:00 to 11:00)
	4	Biodiversity Conservation	Martyrs Isaac Abilio Gomes, S.Pi., M.Pd.I	1. Hj. Sri Suhartini, S.Pd 2. Rufiah, S.Pd 3. Istianah Hajar, S.Pd. 4. Dra. Lina Listiana, Kes.	Tuesday, 02-09-2014 (12:00 to 13:00)	Wednesday, 03-09-2014 (8:30 to 10:00 a.m.)	Wednesday, 03-09-2014 (10:00 to 11:00)

Based on the results of the observations during the first cycle, there were some things that need to be improved, namely (1) the organization of learning time so that it becomes more efficient; (2) needs an explanation of the syntax of GITTW, the students are led and directed step by step; (3) the time management of each stage of the syntax need to be reviewed for the accomplishment of the learning; (4) model teacher needs to manage the groups, so that each group can work more effectively. The weaknesses in the reflection phase of the first cycle were then improved in the second cycle.

Cycle II

The planning stage *(Plan)*, it was determined about the learning material that would be discussed at the second cycle and the review and discussion of learning tools. Discussion and sharing which put more emphases on the improvement of the shortcomings in the first cycle was done. Prepare the observation sheets of completeness of GITTW learning strategy, sheets of completeness of 'lesson study', sheets of the ability in managing the class. It was conducted a review and discussion of the learning material to be used. After that, the schedule of the implementation of *do* and *see* was determined.

The implementation stage *(Do)* was done for two times of open class. The first meeting in this second cycle discussed about "various levels of biodiversity", followed by the second meeting with "conservational efforts of biodiversity", each with 3x45 minute time allocation. At this time, observations of the students' learning activities and the completeness of the learning, completeness of the 'lesson study', and the learning management ability were carried out. The results observation showed that the management of the group work activity had been performing well, so that the activities of students in group II appeared to have been able to work together in a group. In the group, the students with number 5, 14, 19, 21, 25, 30, 31, and 33 had shown seriousness in learning. Syntax strategy GITTW performing well because the students in the group to be guided and directed in doing worksheets so that the learning time more efficiently.

The stage of reflection *(See)*, it was obtained some good results, such as, (1) the learning had been done properly in accordance with the time allocation for each syntax; (2) the students had begun to be active in discussion, coordination and cooperation among groups had started to work well, they planed the ways of task completion (worksheets) and divided tasks within their groups, the students actively asked and gave feedback during the class discussions; (3) The learning tools can be applied very good, each syntax of *GITTW* was

well implemented in accordance with the time allocation, with the simplification of the evaluation phase to be done at home if time not enough. Although there were still some shortcomings, there had been an increase from the first cycle to the second cycle, so that there was no need to proceed to the next cycle.

Through the 'lesson study', in the second cycle, the model teacher could correct some weaknesses in each meeting. One of the weaknesses in the second cycle was the time management of each step of the syntax of GITTW which already ran well. The students' learning activity became very effective. The students became more enthusiastic in learning with the implementation of GITTW based on 'lesson study'.

Completeness of The Steps of *'lesson study'*

The results of the completeness of the 'lesson study' are shown in Table 2.

Table 2. The Monitoring Results of the Completeness of The Steps of 'Lesson Study'

'lesson study' ke-	Skor Keterlaksanaan Tahapan *'lesson study'*			Kriteria
	Plan (%)	*Do* (%)	*See*(%)	
1	92,6	90	92,6	Sangat terlaksana
2	100	95	92,6	Sangat terlaksana
3	100	95	100	Sangat terlaksana
4	100	100	100	Sangat terlaksana
Rata-rata	98,15	95	96,3	Sangat terlaksana

Table 2 shows that all steps of 'lesson study' has been carried out well. The mean of the completeness of the stage *plan* was 98.2%, stage *do* was 95% and the stage *see* was 96.3% , in which all steps can be categorized as very accomplished.

The Completeness of *GITTW* Learning

The results of the observation of the completeness on the implementation *GITTW* strategy are shown in Table 3.

Table 3. The Monitoring Results of The Completeness of GITTW Learning Strategy

Siklus	*'lesson study'* 1	*'lesson study'* 2	Rata-rata	Kriteria
	Persentase	Persentase		
I	81	90	85,5	Sangat terlaksana
II	90,5	100	95,25	Sangat terlaksana
Rata-rata	85,75	94,5	90,1	Sangat terlaksana

Table 3 shows that there the syntax *GITTW* has already well accomplished. The mean of the completeness in the first cycle and the second cycle in the 'lesson study' 1 and 2 can be categorized as very accomplished.

The results of students' activities in the GITTW learning strategy are shown in Table 4.

Table 4. The Monitoring Results of The Students' Activities in The GITTW Learning Strategy

Siklus	*'lesson study'* 1	*Lesson Study* 2	Rata-rata	Kriteria
	Persentase	Persentase		
I	70	85	77,5	terlaksana
II	89	95	92	Sangat terlaksana
Rata-rata	79,5	90	84,75	Sangat terlaksana

Table 4 shows that there the students' activity in the GITTW learning strategy already performed well. The mean of the students' activity of students in the first cycle and the second cycle had run well. Similarly, the first 'lesson study' was implemented well, and the second 'lesson study' can be categorized as very accomplished.

Teacher's Ability in Managing The Learning Using GITTW Strategy

The results of the observation of the teacher's ability in managing the learning by using GITTW strategy are shown in Table 5.

Table 5. The Monitoring Results of Learning Management Using GITTW Strategy

cycles	Scores the ability of teachers to management learning		Average	Criteria
	'lesson study' 1	*'lesson study'*2		
I	3.58	3, 67	3.63	good
II	3.83	3.97	3.9	good
Average	3.71	3.82	3.77	good

Table 5 shows that teacher's learning management ability using GITTW strategy in the first cycle and in the second cycle was categorized as good, similarly, in the 'lesson study' 1 and 2 were categorized as good.

b. Discussion

Implementation 'lesson study' using learning tools with GITTW in biology learning strategies

show an increase in the quality of the learning process. Based on the results of the completeness the 'lesson study' reached 96.3%, and the completeness of the syntax, the implementation of *GITTW* strategy reached 90.1%, Students activities in learning with GITTW strategy already performing well, as well as the ability of teachers to manage learning were categorized as good. This shows that the learning tools in accordance with the strategy and can be applied very well.

The completeness of the learning in cycle I and cycle II of the classroom action research, in which there were 'lesson study' (2 meetings) in each cycle. In the implementation of Plan stage, in general, the plan stage had been implemented very well, and it showed an increase. The mean in cycle I was 96.3%, and the mean in cycle II was 100%. At this stage, all of the learning tools had been prepared, so that the emphasis was given on the discussion and sharing understanding of the learning material to be used. At the *Do* stage, the mean of the completeness of cycle I reached 92.5%, and the second cycle was 97.5%. This showed that this stage had been successfully carried out, although there were weaknesses in the time management of each stage of the syntax of the learning strategy used and the lack of group coordination, especially in cycle I. In the second cycle, there was an improvement, in that the time management could be done well and the group coordination was effective. After that, the implementation of stage *See*, in general, had already been very well and had improved, in which in the first cycle the mean of the completeness was 92.6% and the second cycle was 100%. The stage *See* was carried out immediately after the stage *Do*. This made the process of stage easier in that the results of observation were immediately discussed, so that many things can still be remembered during the stage *Do*. Stage *See* in cycle II, the learning had run very well and it was in accordance with the allocation time. In general, the students' activity, time management, and group coordination had increased. Similarly, the ability of the model teacher in the learning management both in cycle I and cycle II as well as in open class 1 and 2 were categorized as good.

The implementation of 'lesson study' in the learning process was the right step to improve the quality of learning. 'lesson study' actualize the Government Regulations No.19 of 2005 that the learning process should be interactive, inspiring, fun, challenging, motivating to be active, creative, innovative, self-contained, in accordance with talents, interests, and the development of students. This also helps improve the competence of teachers in accordance with the law of the republic of Indonesia number 14 of 2005. It is in line with Lewis (2004) stating that through the 'lesson study', teachers will get some benefits (1) they can think carefully about the objective and the material to be taught to students; (2) they can assess the best things that can be used in teaching by learning from the other teachers; (3) They can learn from the learning material of the other teachers ; (4) they can develop their expertise in teaching ; and (5) they can develop "the eyes to see students". Suparlan (2009) also states that 'lesson study' provides an advantage for teachers, in that by practicing "the best practices", the teachers will train and try to produce innovations in learning.

The completeness of the learning in each stage of the syntax of GITTW in the cycle I and cycle II had already run well. This shows that the learning tools that have been developed could be implemented and could help the students to understand the subject matter. The Biology learning materials that were developed by using GITTW strategy included the syllabi, lesson plans, students' worksheets and evaluation instruments. The review of the learning materials using GITTW strategy after the completion of cycle I yielded some improvements, such as; (1) the implementation time on the evaluation stage was matched with the available time. At this stage, there were some test items relating to the material discussed, thus for the implementation it could be directly done or it could be used as homework or individual assignment; (2) sharing the results of the discussions between groups was not done after the completion of each stage of the syntax, but it was done after a two-stage or three-stage syntax. This was done to make the time effective, so that the syntax of the learning strategies could be implemented well.

The learning tools of GITTW strategy were developed in accordance with the demands of 21st century education that focuses on improving thinking skills and a high level of cognitive ability. This is in line with Ibrohim (2012) who proposed that some of the principles in preparing *lesson plan* in the implementation of 'lesson study' were (1) developing a learning

that is active, creative, effective and fostering the self-reliance of students; (2) achieving high-level cognitive abilities;(3) develop the ability to express ideas with a sense of responsibility, confidence and other affective aspects; (4) developing and implementing of innovative learning process.

Learning using GITTW strategy-based on 'lesson study' also showed that the students' activity during the learning process had run well. It could be seen from the higher number of the students who asked, commented or helped answer questions. The discussion process in the group ran smoothly and effectively, as well as the presentations and question and answer session. The students' activity during the learning process with GITTW strategy in cycle I was quite accomplished. There were some things that had not been implemented at the stage of the syntax of GITTW, which were, asking questions, noting the learning objectives, identifying subtopics, planning a way of solving the problem, dividing the tasks to group members, and reflection. After that, in cycle II, the students' activity in asking and group work in accordance with the stages of the syntax had already run well.

The completeness of GITTW learning strategy with the implementation of 'lesson study' could not be separated from the teacher's role as the manager of learning. In the implementation of cycle I and cycle II, the teacher's ability in managing the learning was quite good. It could be seen from the management of the learning activities from the beginning until the end of the activities was carried out well. The teacher's role is very important in determining the quality of the learning, and therefore the ability of teachers must continue to be honed in terms of pedagogic competence, professional competence, personal competence and social competence. Through sustainable 'lesson study', teacher's ability to teach, manage learning and design techniques or learning model will be trained. It is expected that there will be an increase in the quality of the learning process.

The completeness of the syntax of GITTW already had run very well and characterized as very accomplished. It showed that the learning activity had run as expected. An increase in the students' cognitive learning results was from the strategy implemented. The cognitive learning results of the students who were taught by using GITTW strategy showed that there was an increase in students' Biology cognitive learning results from cycle I to cycle II as much as 23.2%, with the mean score of the cognitive learning in cycle I as much as 59.77 and cycle II as much as 77.80. These results show that the learning activity using GITTW strategy can help students improve and train their high-level cognitive abilities.

GITTW learning strategy had an effect on students' Biology cognitive learning results. The stages of GITTW strategy have the characteristics and advantages in achieving the aspects of students' cognitive abilities. GITTW strategy is the combination of *GI* strategy and TTW strategy which are packaged in the form of cooperative learning. In the *GITTW* learning strategy, where TTW strategy is integrated into *GI* strategy, with the aim to complement each other's weaknesses and to optimize students' cognitive ability in Biology learning process. This combination of these strategies gives the strength in stimulating the students' cognitive activities during the learning process, such as identifying topic, planning and dividing tasks and solving problems. GITTW strategy is believed to be a new cooperative model that has enormous potential to empower cognitive abilities. This strategy consists of a combination of syntax that is expected to help students to improve their cognitive learning results.

GI strategy has the advantages in improving learning results, that is, it can help students understand difficult concepts. According to Sharan & Sharan (1992) GI strategy is learning where students experience meaningful learning because they are faced with the steps of scientific inquiry. Slavin (2005) also affirmed that through GI strategy, students are active in constructing their own knowledge. It will be easier to construct concept understanding if they share in learning. Several other studies agree that the GI strategy helps students develop cognitive abilities, because this model involves the skills of high-level thinking in resolving tasks (Santyasa, 2008). GI strategy is also more potential in empowering students' thinking skills (Nasrudin & Azizah, 2010; Listiana, 2013), and result of research found that GI strategy could increase science learning activity and thinking skills as well as scientific attitude (Nasrudin & Azizah, 2010). GI strategy has an effect on creative thinking skills and

concept understanding of Biology (Suartika et al, 2013; Sudewi , 2014).

GITTW strategy is inseparable from *TTW* strategy. In addition to the stages of *GI* strategy that encourages the development of students' metacognitive skills, it is also strengthened by the integration *TTW* strategy at every stage of the *GI*. *TTW* strategy, with its syntax, is able to improve students' cognitive learning results, as seen in the activity of think, talk, and write which requires higher thinking skills. Students are required to integrate their cognitive abilities when they observe images or video, watch discourse, then discuss and make a report. All of these activities will enable the students to develop their thinking skills which will significantly improve their learning results. Several researches conducted by Sholikhah (2009) and Astohar (2010) in the fields of biology, Juniasih (2012), Puspita (2012) and Sulistyaningsih (2012) in the field of mathematics, revealed that the implementation of TTW learning strategy was more effective in improving students' learning results.

GITTW strategy was proven to improve quality of learning process. The combination of these strategies provides a greater opportunity to empower students' cognitive abilities, improve their high thinking skills that will ultimately improve their Biology learning results.

The findings of research show that implementation of 'lesson study' can improve the quality of learning tools with GITTW strategies that can improve the quality of the learning process, as well as to optimize the empowerment of cognitive abilities. The completeness of the stages of 'lesson study', the completeness of the syntax of GITTW, and students' activities in the learning process ran very well.

4. CONCLUSION

From the results of the research, it can be concluded that the implementation of 'lesson study' can improve the quality of learning tools with GITTW strategies that can improve the quality of the learning process, as well as to optimize the empowerment of cognitive abilities. The completeness of the stages of 'lesson study' can be accomplished well, and the completeness of the syntax of GITTW learning strategy, and the students' activity ran very well. Similarly, the teachers' learning management ability of GITTW strategy can be categorized as good.

Suggestions: (1) the implementation of 'lesson study' in learning should be carried out periodically and sustainably, so that it will be able to improve the professionalism of the teachers, especially those related to professional and pedagogical competence and improve the quality of teaching and learning process in the classroom; (2) GITTW strategy can be used by teachers as one of the development strategy of cooperative learning and as a variation of learning strategy that can empower students' cognitive ability and improve their Biology learning results; (3) preparation of learning tools should be designed in accordance with the applied learning strategies.

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