

# Portrait of Metacognitive Awareness of Prospective Biology Teachers of Malang State University Through Learning Journal on Lesson Study-Based Learning

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## ABSTRACT

This research aims to find out the metacognitive awareness portrait of prospective teacher students after learning with lesson study and assignment in the form of learning journals. The type of research is a pre-experiment research with one-group pretest-posttest design. Research sample consists of 30 prospective teachers in 21st Century Biology Education course. Collecting research data using student learning journal, modified self-assessment questionnaires from Greenstein and pretest-posttest work. Data analysis has done by descriptive analysis using descriptive statistics to show descriptions or portraits of student metacognitive awareness and gain score tests. The results showed that the percentage of metacognitive awareness from the student learning journal of prospective teachers was 70%-100%, the results of the self-assessment questionnaire analysis show that the metacognitive awareness of prospective teacher students is in the category of good to excellent, and the results of the gain score test in the medium category.

**Keywords:** *Metacognitive awareness, Learning journal, Lesson study.*

## 1. INTRODUCTION

The 21st century is a time for the growth of knowledge. In this era all alternative efforts to fulfill the needs of life in a variety of contexts more knowledge-based. Efforts to meet the needs of knowledge-based education, knowledge-based economic development, development, and empowerment of knowledge-based communities [1]. Teaching students in 21st century education requires methods of how to learn independently and to do so students need to be aware of how they learn [2], this is called metacognitive. Metacognitive was first created by Jhon Flavell in 1970 which means that metacognitive is cognition of cognitive phenomena or better known for thinking about thinking [3]. Metacognitive awareness is a form of student consciousness to think about how students can learn independently [4]. This awareness refers to capabilities such as planning, self-monitoring, and self-evaluation and will represent authentic procedures

and strategies used to monitor and control a person's cognition [5].

Observations conducted in August 2019 showed that students in the 21st Century Biology Education course in 2016 had low metacognitive awareness. This is evidenced by the finding in the classroom that students are still often late to enter the classroom, some students do not collect the assignments that have been given, students still often open social media when their friend presents in front of the class, most students do not master the material at the time of presentation in class and only read the material in powerpoint. Metacognitive awareness of students in the low category is thought to be due to most of the learning is still conventional [6]. Learning conducted at the beginning of the lecture week in the course of Biology Education 21st Century using presentation and discussion methods. This makes learning tedious for students, making the metacognitive awareness of students low.

There are several things that can be done to develop metacognitive awareness, including by creating a learning journal and through lesson study-based learning. Learning journals are done by prospective teacher students from the beginning to the end of the meeting. Implementation of lesson study learning in class after the midterm exam for two months. Learning journals are another way to develop student metacognitive awareness. Through learning journals have an impact in terms of improving creativity and self-reflection during learning implemented [7]. While through lesson study-based learning activities, students can identify a learning problem and design a learning scenario (plan stage), applying the planned learning while other friends observe the learning (do stage), reflect and evaluate (see stage), and revise learning scenarios [8]. Lesson study (*jugyō kenkyū*) is a process of improving teaching derived from Japanese primary education and implementing widespread professional development practices. Working in small groups, teachers collaborate with each other, meet to discuss learning objectives, plan actual class lessons or so-called "research lessons", observe how their ideas work in lessons directly with students, and then report the results so that other teachers can take advantage of them [9].

With the activity of learning journals and lesson study activities, students are expected to increase their metacognitive awareness. Based on the description, metacognitive awareness is important for every individual, including a teacher or prospective student [10]. Prospective students who have good metacognitive awareness can not only succeed in the academic field but are also expected to facilitate their students to learn well [11]. This is because prospective teacher student will generally be more aware of what needs to be done during the teaching planning to evaluate their own learning process to impact the learning outcomes of the students who are taught. Besides, students with good metacognitive awareness can only be produced by teachers with good metacognitive awareness [12].

## 2. RESEARCH METHOD

The study used a pre-experimental design with a pretest-posttest one-group design. The number of groups implemented only one class of 30 prospective teachers in the 21st Century Biology Education course. Lesson study implementation used only one class as a research object. The research sample used lesson study where the teaching student is the prospective teacher and the student is another prospective teacher student in the same class. Data collection used a self-assessment questionnaire consisting of 15 modified statements from Greenstein [4], pretest-posttest, and learning journals created by prospective biology teachers. Analysis techniques of poll results by used descriptive analysis to see students' cognitive awareness. Pre-test and post-test results were analyzed using normalized gain scores [13].

## 3. RESULT AND DISCUSSION

At the PLAN stage, model lecturers and the lesson study team design a learning process based on problems found in the classroom. The design of the learning process includes the creation of chapter design, learning implementation plan, lesson design, student activity sheet (MFI), and learning media. The next stage is the DO stage, at this stage the model lecturers carry out the learning that has been designed with the lesson study team. All implementation of teaching activities is assessed by lesson study teams who do not teach. At this stage there was also advantages and disadvantages of the learning process that has been implemented. The last stage of learning using lesson study is SEE. At this stage the lesson study team and students evaluate the learning that has been done together. The advantages of the learning process can be used as a reference for other prospective teachers to improve the learning activities that will be carried out. The shortcomings presented by students and lesson study teams serve as evaluation materials for model lecturers to improve the way of teaching in the future. The results of the analysis of data on the journal of the learning journal can be seen in table 1.

**Table 1.** Descriptive analysis results of prospective teacher student learning journal

Learning Journal Components	Percentage of Student Learning Journals
Explore important concepts learned	100
Presenting concepts that are not yet understood	83.33

Learning Journal Components	Percentage of Student Learning Journals
Learning journals show that students can see themselves as learners, discover and solve problems and work to improve their learning habits	86.67
There are valuable lessons to be learned from the results of the learning that has been done.	70
Develop a plan ahead based on lesson learned results	93.33

Table 1 shows that 30 prospective students have explored various concepts that are important to learn in their learning journals. This proves that the metacognitive awareness of prospective teacher students has been good at understanding the concepts that have been studied. 93.33% of students have also been able to draw up plans in the future after learning with lesson study. This is because lesson study can empower the metacognitive awareness of prospective teacher students at the time of plan together with their friends. Judging from the student learning journal of prospective teachers, it can also be known if metacognitive awareness at the monitoring and evaluating stage has also been well empowered. This is seen from the percentage of 86.67% of students able to present themselves as learners, find and solve problems and work to improve their learning habits. Unlike valuable lessons that can be learned, only 70% of students write them in a learning journal.

A learning journal is a reflexive record of prospective teacher students during the learning process containing material that has been understood, that has not been understood and that needs to be learned further to achieve the goal of learning. Learning journals are not summaries of learning materials but focus more on the results of self-reflection and the results of students' thoughts on what has been learned or obtained after learning. The reflection process is a key pillar in empowering metacognitive awareness that can be realized through learning journals [14]. The ability to reflect and monitor the learning process makes students able to see the advantages and weaknesses in learning and metacognitive awareness of students develop. Metacognitive awareness also helps students understand the material and solve the problems at hand. Students who use metacognitive awareness well can be critical thinkers, good problem solver, and good decision makers [15].

The results of research using learning journals show most students are at a percentage of 70-100% because it shows good self-reflection results for every aspect of the learning journal which can write the

material understood, difficulties faced and completion steps, write down what to learn along with the reasons, tell the learning experience and write down learning strategies. The ability of students to reflect learning activities well in learning journals due to the utilization of metacognition awareness such as knowledge of self-weakness and planning of learning activities that become the basic capital in learning. Metacognitive awareness is necessary for learning success as it allows students to manage cognitive prowess and regulate the learning process [14]. This means that students can know how the learning process includes planning, monitoring and evaluating in learning. Learning journals become the right place to develop metacognitive awareness because students can diagnose their advantages and weaknesses. Here's a snapshot of one of the student learning journals. "Today's learning is fun, I can understand the material about 21st century life skills which consists of four aspects of collaboration skills, working productively, showing respect, compromise, and responsibility together. Besides, there are some things I don't yet understand. Can collaboration skills go the best way when in a learning group there are students who are very good and there are students who are less good at learning? Is it always good students to teach students who are less good at it?. Through learning with Lesson Study can increase my confidence because a prospective teacher is trained to teach his peers. In addition, get very valuable input from lecturers and teammates. Good cooperation between team members makes learning using Lesson Study a success to be implemented in the classroom. The valuable learning that can be learned is that we as prospective teachers must be patient in dealing with students who have a variety of unique characters. In addition, a teacher should also be able to be a good example for his students one day".

Learning journals and metacognitive thinking strategies have a relationship in learning so that students experience a meaningful learning process [14]. Learning journals and metacognitive thinking strategies focus on the process of reflection as a step

**Table 2.** Student questionnaire results of prospective teachers after learning with lesson study

Components	Questions	Percentage	Criteria
Planning	I considered a variety of options before I solved a problem.	92.22	Excellent
	I thought about what I really needed to learn, before doing a task.	84.44	Excellent
	Before starting something, I ask myself about related things.	70.00	Good
	I considered various ways to solve a problem before finally deciding on one of them.	83.33	Excellent
Monitoring	I constantly organize myself during my studies to have enough time.	81.11	Good
	I have control over how well I learn.	81.11	Good
	I ask other people if I don't understand something.	80.00	Good
	I asked myself if what was being read was related to what I already knew.	83.33	Excellent
	I set my time to achieve my goals as best I can.	84.44	Excellent
Evaluating	I try to use the ways I've used it before.	86.67	Excellent
	I understand the strengths and weaknesses of my intelligence.	87.78	Excellent
	I did a review to help me understand important relationships.	83.33	Excellent
	I asked myself about how well I worked, at the time learning something new.	75.56	Good
	I pay more attention to the general meaning than the special meaning.	75.56	Good
	I learn more if I'm interested/happy with the topic.	90.00	Excellent

Source: Development of Greenstein [4]

of self-introspection in learning. A student will learn better and more meaningfully if the student can understand the learning process that has been experienced to stimulate cognitive development [16]. Students who are aware of the commitment and attention to learning, then students will not forget to monitor the learning process. [17]. Monitoring has an impact on motivation and helps students in the learning process to optimize their learning outcomes. Based on the above description it can be said that the journal of learning and awareness makes students experience a meaningful learning process. Meaningful learning is learning that makes the learning experience part of the learning process. Students are allowed to reflect on learning activities to diagnose weaknesses

and advantages that can be used to devise a plan to improve their learning.

The results of the prospective teacher's questionnaire after learning using lesson study are described in table 2. Table 2 shows that the metacognitive awareness of prospective teachers in the planning component is within the criteria very well, thus it can be said that prospective students can already manage how to learn and obtain information. The monitoring and evaluating components are on the criteria well to very good, thus when prospective students find obstacles in the learning process, students can immediately improve the way of learning and how to obtain information to get the most results. Thus, learning with lesson study can help students to empower their metacognitive awareness.

**Table 3.** N-Gain score of prospective teacher students after learning with lesson study

Pretest Average	Posttest Average	N-Gain Score	Category
46.17	70	0.44	Medium

Table 3 shows if after learning with the lesson study there was an improvement in the metacognitive ability of prospective teachers who were in the medium category. Pre-test for students is carried out before lesson study and post-test is conducted when learning through lesson study has been completed.

Lesson Study has an influence in improving competencies and learning processes in the classroom [18]. Competencies can be student activities and learning processes facilitated by teachers in the classroom [19]. The influence on the application of lesson study in the student class of prospective biology teachers provides an increase in the awareness of metacognition in the medium category. This is in line with previous research, that application lesson studies can improve student metacognition [18], [20]. Metacognition skills in students should be explored and developed as students become successful learners [21]. Lesson study trains the metacognitive awareness of prospective teacher students because this activity has several stages, namely PLAN, DO and SEE.

At the student PLAN stage, prospective teachers and other prospective teachers exchange ideas to use what learning models to use, what media to use, how to teach students so that the skills needed in the 21st century can be achieved. This stage of the plan is very helpful for prospective teachers to train their metacognitive awareness. In addition, prospective students also exchange thoughts and experiences when addressing problems found while teaching. Learning observation planning is structured together to address learning issues rather than focusing on teacher performance individually [22]. The plan is used by prospective student teachers to determine the series of learning activities [23]. The identification of problems in the framework of problem solving planning relates to subjects relevant to the class and lesson schedule, student characteristics and classroom atmosphere, learning methods, media, props, and evaluation of learning processes and results [24]. From the results of the identification discussed the selection of learning materials, the selection of methods used in this study involves metacognitive awareness.

The stage after the plan is DO. At this stage a prospective teacher student who has been agreed, implementation of the lesson implementation plan that

has been drawn up, in the classroom. Lecturers and other prospective students make observations using prepared observation sheets and other necessary devices. Observers noted positive and negative things in the learning process, especially in terms of student behavior. In this process, the metacognitive awareness of prospective teacher students who are learned is also empowered by the way prospective teachers who act as teachers give their students the opportunity to ask themselves, whether the benefits gained by studying this subject matter, what can I gain by studying this subject matter, how I can understand and master this subject matter, whether I can understand or cannot understand the subject matter [25].

The last stage of the lesson study activity is SEE. The SEE stage aims to find the advantages and disadvantages of learning implementation. Prospective teacher students who serve as model teachers start the discussion by conveying their impressions and thoughts about the implementation of learning. The next opportunity is given to another prospective student teacher who serves as an observer [26]. The results of this SEE stage will be reconsidered for the PLAN and DO stage for further learning improvements. From the results of reflection can be obtained a number of new knowledge or important decisions for the improvement and improvement of the learning process, both on an individual, and managerial level [8]. The SEE stage can also train a student's metacognitive awareness because in the judging process, the teacher gives the student the opportunity to ask himself or her, how knowledge can be understood, why the student finds it difficult or easy to master the subject matter, is there any action to be taken. By carrying out these three stages, teachers can bring students to think of strategies that are more appropriate in mastering the subject matter.

#### 4. CONCLUSION

Based on the results of research that has been done for two months with the implementation of lesson study-based learning and assignment using learning journals can empower metacognitive awareness of prospective teacher students. Measurements conducted based on learning journals showed metacognitive awareness of prospective teacher students was 70%-100% while the results of a modified self-assessment poll analysis from Greenstein [4] showed that the metacognitive awareness of prospective teacher students was in the category of good to excellent. N-gain scores are in the medium category.



**REFERENCES**

- [1] A. Mukhadis, Sosok Manusia Indonesia Unggul dan Berkarakter dalam Bidang Teknologi sebagai Tuntutan Hidup di Era Globalisasi, *Jurnal Pendidik. Karakter* 2 (2013) 115-116.
- [2] H. A. Alismail, P. McGuire, 21 St Century Standards and Curriculum: Current Research and Practice, *Journal of Education and Practice* 6 (2015) 152.
- [3] E. R. Lai, Metacognition: A Literation Overview, 2011, Accessed on: Oct. 2020, [Online]. Available: [https://moodle.elac.edu/pluginfile.php/111973/mod\\_resource/content/0/Metacognition\\_Literature\\_Review\\_Final.pdf](https://moodle.elac.edu/pluginfile.php/111973/mod_resource/content/0/Metacognition_Literature_Review_Final.pdf)
- [4] L. Greenstein, *Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning*, Corwin, 2012.
- [5] T. García, M. Cueli, C. Rodríguez, J. Krawec, P. González-Castro, Metacognitive Knowledge and Skills in Students with Deep Approach to Learning. Evidence from Mathematical Problem Solving, *Journal of Psychodidactics* 20 (2015) 211. DOI: <https://doi.org/10.1387/RevPsicodidact.13060>
- [6] A. D. Corebima, Pembelajaran Biologi di Indonesia Bukan untuk Hidup, in: *Proceeding Biology Education Conference*, vol. 13, Universitas Sebelas Maret, Surakarta, 2016, pp. 8-22.
- [7] N. Hidayati, Pembelajaran Discovery Disertai Penulisan Jurnal Belajar untuk Meningkatkan Kemampuan Kerja Ilmiah Siswa Kelas VIII.1 SMP Negeri 1 Probolinggo, *Jurnal Penelitian Pendidikan IPA* 1 (2016) 60. DOI: <http://dx.doi.org/10.26740/jppipa.v1n2.p52-61>
- [8] S. Zubaidah, Lesson Study as a Model of Teacher Professionalism Development 1, *National Education and Training Conferences with the theme of Increasing Teacher Professionalism through Lesson Study Activities*, Malang, 2010. pp. 1-14.
- [9] A. Takahashi, T. Mcdougal, Implementing a New National Curriculum: A Japanese Public School's Two-Year Lesson-Study Project, *National Council of Teachers of Mathematics*, 2014.
- [10] Y. Jiang, L. Ma, L. Gao, Assessing teachers' metacognition in teaching: The Teacher Metacognition Inventory, *Teaching and Teacher Education* 59 (2016) 411. DOI: <https://doi.org/10.1016/j.tate.2016.07.014>
- [11] N. Zhao, J. Wardeska, S. McGuire, E. Cook, Metacognition: An Effective Tool to Promote Success in College Science Learning, *Journal of College Science Teaching* 43 (2014) 53. DOI: [https://doi.org/10.2505/4/jcst14\\_043\\_04\\_48](https://doi.org/10.2505/4/jcst14_043_04_48)
- [12] M. Demirel, İ. Aşkın, E. Yağcı, An Investigation of Teacher Candidates' Metacognitive Skills, in: *Procedia - Social and Behavioral Sciences*, vol. 174, Elsevier, Amsterdam, 2015. p. 1527. DOI: <https://doi.org/10.1016/j.sbspro.2015.01.783>
- [13] R. R. Hake, *Analyzing Change/ Gain Scores*, 1999, Accessed on: Oct. 2020, [Online]. Available: <http://lists.asu.edu/cgi-bin/wa?A2=ind9903&L=area-d&&P=R6855>
- [14] K. Septiyana, A. P. B. Prasetyo, W. Christijanti, Jurnal Belajar sebagai Strategi Berpikir Metakognitif pada Pembelajaran Sistem Imunitas, *Journal of Biology Education* (2013) 2-7.
- [15] S. Atmatzidou, S. Demetriadis, P. Nika, How Does the Degree of Guidance Support Students' Metacognitive and Problem Solving Skills in Educational Robotics?, *Journal of Science Education and Technology* 27 (2018) 14. DOI: <https://doi.org/10.1007/s10956-017-9709-x>
- [16] B. Walgito, *Introduction to General Psychology*, Andi Offset, 2003.
- [17] B. H. Pillow, Development of Children's Understanding of Cognitive Activities, *Journal of Genetic Psychology* 169 (2008) 314. DOI: <https://doi.org/10.3200/GNTP.169.4.297-321>
- [18] Y. Pantiwati, Pemanfaatan Lingkungan Sekolah sebagai Sumber Belajar dalam Lesson Study untuk Meningkatkan Metakognitif, *Jurnal Bioedukatika* 3 (2015) 31-32. DOI: <https://doi.org/10.26555/bioedukatika.v3i1.4144>
- [19] R. B. Anwar and D. Rahmawati, Implementasi Lesson Study Untuk Meningkatkan Kinerja Dosen Pendidikan Matematika FKIP Universitas Muhammadiyah Metro, *Journal of Mathematics Education* 4 (2015) 4. DOI: <https://doi.org/10.24127/ajpm.v4i1.65>
- [20] D. Setiawan and H. Susilo, Peningkatan Keterampilan Metakognitif Mahasiswa Program Studi Biologi Melalui Penerapan Jurnal Belajar Dengan Strategi Jigsaw Dipadu PBL Berbasis Lesson Study Pada Matakuliah Biologi Umum, *Prosiding Seminar Nasional Pendidikan Biologi*, UMM, Malang, 2015. pp. 359-369.
- [21] M. Lukitasari, J. Widiyanto, and Y. M. Yahya,

- Penggunaan Analisis Kritis Untuk Meningkatkan Kemampuan Metakognitif Pada Pokok Bahasan Pengelolaan Lingkungan Siswa SMP, *Jurnal Biologi Dan Pembelajarannya* 3 (2016) 28. DOI: <https://doi.org/10.25273/florea.v3i2.796>
- [22] W. Cajkler, P. Wood, J. Norton, D. Pedder, and H. Xu, Teacher perspectives about lesson study in secondary school departments: a collaborative vehicle for professional learning and practice development, *Research Papers in Education*, vol. 30, 2015. p. 192. DOI: <https://doi.org/10.1080/02671522.2014.887139>
- [23] D. W. Sulistyono and A. Wiradimadja, Lesson Study (LS): Memahami ‘Masalah Penelitian’ Kepada Mahasiswa, *Jurnal Teori Dan Praksis Pembelajaran IPS* 4 (2019) 31. DOI: <https://doi.org/10.17977/um022v4i12019p029>
- [24] M. V. Juhler, The Use of Lesson Study Combined with Content Representation in the Planning of Physics Lessons during Field Practice to Develop Pedagogical Content Knowledge, *Journal of Science Teacher Education* 27(5) (2016) 538. DOI: <https://doi.org/10.1007/s10972-016-9473-4>
- [25] T. Isozaki, Lesson Study Research and Practice in Science Classrooms, in *Encyclopedia of Science Education*, Springer Netherlands, 2015.
- [26] H. Susilo, Lesson study sebagai sarana meningkatkan kompetensi pendidik, *Seminar dan Lokakarya PLEASE, STTA, Lawang*, 2013, pp. 1–32.