



PROCEEDINGS

BECOMING REFLECTIVE EDUCATORS AND PROFESSIONALS OF LEARNING
November 25–28, 2014

World Association of Lesson Studies
International Conference 2014 in Bandung, Indonesia

WALS



Organized by :

Indonesia University of Education
World Association of Lesson Studies

Sponsorship :

West Java Provincial Office of Education
Government of Bandung City
Ministry of Higher Education Research and Technology
Japan International Cooperation Agency (JICA)

Published by :

Pusat Inovasi Pendidikan
Lembaga Penelitian dan Pengabdian Kepada Masyarakat
Universitas Pendidikan Indonesia

Editor by :

Sumar Hendayana, Ph.D.
Dr. rer. nat. Asep Supriatna, M.Si.
Pupung Purnawarman, Ph.D.
Tatang Suratno, M.Pd.
A.Taupik Rahman, S.T.

ISBN 978-602-99410-1-2

Secretariate : Pusat Inovasi Pendidikan
Lembaga Penelitian dan Pengabdian Kepada Masyarakat (LPPM)
Indonesia University of Education
Gedung LPPM UPI 3rd Floor
Jl. Dr. Setiabudhi No.229 Bandung
E-mail : wals2014@upi.edu
Website : wals2014.upi.edu



PREFACE

On behalf of the Organizing Committee of World Association of Lesson Studies (WALS) 2014 International Conference, I would like to welcome all participants both local and overseas to the 8th annual conference at Indonesia University of Education in Bandung, Indonesia. The Bandung conference has attracted attention of international community around the globe. There are 782 registered participants from 29 countries with the largest contingent from Indonesia followed by Singapore, Japan, and Sweden.

The theme of WALS 2014 International Conference is **Becoming Reflective Educators and Professionals of Learning**. This theme reflects the continuity of efforts to be reflective educators and professional who never stop learning. Such is represented in the form knowledge, expertise, and other resources which are developed, invested, accumulated, and distributed to improve the quality of teaching and learning.

In this conference, educators and teachers from Africa, America, Asia, Australia and Europe continents come together to share their research and practices on improving the quality of teaching and learning, teacher education and development, school improvement, and learning community through Lesson and Learning Studies.

This proceeding is a collection of papers presented in the WALS 2014 International Conference. It covers 13 strands:

1. Teacher Professional Development
2. Action Research
3. Pedagogies and Teaching Strategies
4. Designing for Learning with Quality in Specific Subjects
5. Research on Lessons in Different Cultures
6. Issues about Leading Lesson Study
7. Learning Communities for School Reform
8. Developing Communities of Practices
9. Creating Knowledge in Practice
10. Student Learning and Development
11. Lesson and Learning Study in Pre-School
12. Lesson and Learning Study in Special Education settings
13. Lesson and Learning Study in Higher Education

We are sure that the papers and discussions from WALS 2014 International Conference will make a major contribution to the national and international dialogue on Lesson/Learning Studies. However, we would like to remind that the views expressed in the papers are those of each author alone and do not necessarily represent those of the organizing institutions or any of their affiliates.

I wish all of us a fruitful conference and opportunities to build networking during the conference. I hope you enjoy the conference and your time at UPI.

Sumar Hendayana, Ph.D.
Chair
Organizing Committee of WALS
2014
International Conference

Welcome Message

On behalf of the Organizing Committee of World Association of Lesson Studies (WALS) 2014 International Conference, I would like to welcome all participants both local and overseas to the 8th annual conference at Indonesia University of Education in Bandung, Indonesia. This Bandung conference has attracted attention of international community around the globe to join WALS 2014 conference in Bandung . We have 782 registered participants from 29 countries with the largest contingent from Indonesia followed by Singapore, Japan, and Sweden. The theme of WALS conference this year is "Becoming Reflective Educators and Professionals of Learning" as we would like to emphasize the how importance it is for teachers and educators to always reflect and learn from their practices in order to improve their professionalism.

This conference program provides you with information about papers, speakers, and venues. Three hundred eighty-six papers will be shared and discussed during the three-day conference. Four papers will be presented by four recognized keynote speakers from United Kingdom, Japan, United States of America, and Indonesia. Ten papers will be shared on two plenary sessions by invited speakers. Participants have many choices to attend concurrent sessions of 372 papers consisting of symposium, workshop, poster, and paper presentations. In addition, the conference offers participants with optional school visits at all levels of education from pre-school to higher-education on November 28, 2014. During the school visit, participants may observe lessons and participate in a post class discussion.

Collaboration and partnership are the spirit of lesson study. WALS 2014 is made possible through the collaboration and partnership with the Directorate General of Higher Education and West Java Provincial Office of Education.

I wish all of us a fruitful conference and opportunities to build networking during four days of the WALS 2014 International Conference. I hope you enjoy the conference and your time at UPI.



Sumar Hendayana, Ph.D.
Chair
Organizing Committee of WALS 2014
International
Conference

It is with great pleasure that I welcome all of you to the World Association of Lesson Studies (WALS) 2014 annual conference in Bandung, Indonesia. WALS is privileged to work together with Indonesia University of Education in organizing this conference and to receive the support from Ministry of Higher Education, Research and Technology, Republic of Indonesia, West Java Provincial Office of Education, the Government of Bandung City, and Japan International Cooperation Agency (JICA). The Indonesia University of Education has been playing an important role in developing and disseminating Lesson Study across Indonesia as well as to other countries in Asia and Africa through technical cooperation with JICA.

The conference organizing team led by Dr. Sumar Hendayana from Indonesia University of Education has worked extremely hard to ensure the success of our annual conference. As of October 2014, the conference has drawn 819 delegates with the largest contingent from Indonesia (375) followed by Singapore (197), Japan (68), Sweden (48), Philippines (18), Malaysia (16), Thailand (13), United Kingdom (11), China (8), Hong Kong (8) and Brunei (7). For the first time, African countries such as Ethiopia (7), Zambia (7) and Senegal (2), as well as Bangladesh are represented at a WALS annual conference. This outreach to new countries reflects the influence that Indonesia has in these countries as a result of the partnership they have with JICA and Japanese colleagues working in African countries. A total of 28 countries will be represented at WALS 2014 annual meeting in Bandung.

We look forward to the rich conversations among our delegates during the conference on the theme ***Becoming Reflective Educators and Professionals of Learning***. There are **304 papers, 50 posters, 9 workshops, 9 symposiums, 10 plenary sessions and 4 keynotes**. Our annual conferences bring teachers, academics, researchers and policy makers together to discuss lesson study research and practices and to learn from each other's work. We hope to see the development of professional and academic networks through mutual assistance and information exchange among our members at this meeting.

The success of WALS 2014 Bandung meeting is made possible by the dedication of the local organizing team led by WALS Executive Committee and Council Member, Dr. Sumar Hendayana from Indonesia University of Education. We want to thank them for their hard work over the last 2 years to provide an interesting and stimulating conference programme for all participants. We want to thank the Indonesia University of Education for hosting this conference. We are also thankful for the generous support from Ministry of Research, Technology, and Higher Education, Republic of Indonesia, West Java Provincial Office of Education, the Government of Bandung City and Japan International Cooperation Agency (JICA).

I wish all of you a fruitful and engaging time at WALS 2014.



Associate Professor
President,
World Association of Lesson Studies
National Institute of Education,
Nanyang Technological University, Singapore

On behalf of the West Java Provincial Office of Education, we welcome all the participants from Indonesia and overseas. One of the missions of the West Java Provincial Office of Education is improving the access and quality of education. One of the strategies in improving the quality of education is by implementing Lesson Study as a form of teacher continuing professional development through partnership with UPI that has been established since 2006 to develop and disseminate best practices on lesson study in West Java. Beginning with the piloting of lesson study in Sumedang District, lesson study then spread to 16 districts/cities in West Java. Thousands of teachers in West Java have enjoyed the benefits of Lesson Study for the improvement of the quality of education as activities in lesson study have updated their knowledge and skills in facilitating students' learning.

Activities in teacher professional development through lesson study are conducted at school so that the training for teachers becomes more contextual in solving problems at class levels, it does not require high expenses, and it does not cause teachers to abandon their students while participating in the training. Teachers become confident and accountable in teaching students and teaching-learning activities tend to shift from teacher-centered to student-centered while teacher sensitivity toward students experiencing learning problems has increased. In addition, teachers who have been accustomed to lesson study can adapt easily in implementing the Curriculum 2013 because teacher collaboration in analyzing lessons is not something new in lesson study. Teachers have been accustomed to analyzing lessons to stimulate students to think and reason, and build their knowledge so that students understand phenomenon and not to memorize facts.

At WALS 2014 Conference, West Java Provincial Office of Education has facilitated 200 teachers to participate in this conference and half of them present their papers to share their experiences in lesson study. Through this conference, we hope that teachers in West Java will gain more knowledge to even more optimize classroom teaching and learning. Last but not least, we hope that you enjoy the cool atmosphere of Bandung and the conference.



Prof. Dr. H. Moh. Wahyudin Zarkasyi, CPA
Head of West Java Provincial Office of Education

On behalf of the Directorate of Learning and Student Affairs, Ministry of Higher Education, Research and Technology. We wish you the warmest welcome to all participants from various countries. We have facilitated forty-two LPTKs (Educational Institution for Teacher Training) from Aceh to Papua with grants to develop lesson study to improve the quality of learning in higher education since 2009. We collaborate with teaching and learning experts from UPI (Indonesia University of Education), UNY (State University of Yogyakarta), and UM (State University of Malang) to foster LPTKs in the Western, Central, and Eastern regions of Indonesia. The supports in the forms of block grants for three years have been put to good use by LPTKs to focus on the improvement of teaching and learning quality. In addition, LPTKs partner with neighboring schools to develop school-based lesson study in the third year.

Through lesson study, University lecturers collaborate with teachers to plan, implement lesson plans, and reflect the teaching and learning processes. We witness positive changes from the grant recipients such as lecturers have become more accountable and open to criticism in carrying out teaching and learning activities, and have become more confident in teaching students. There is also a paradigm shift in classroom teaching from teacher-centered to learner-centered, and a more harmonious relationship between LPTKs and schools. Results of the development of lesson study in grant-receiving LPTKs will be shared in WALS 2014 Conference. One of the characteristics of WALS 2014 International Conference is the addition of a new strand called Lesson Study in Higher Education Setting.

We hope that participants of WALS 2014 Conference can learn from each other and build international networks in enhancing the quality of education. Please enjoy your stay in Bandung and we hope you enjoy WALS 2014 Conference.



Dr. Ilah Sailah
Director,
Directorate of Learning and Student Affairs
Ministry of Higher Education, Research and Technology

In this very happy occasion, on behalf of the Indonesia University of Education or Universitas Pendidikan Indonesia (UPI), I would like to welcome all the conference participants, both Indonesian and international participants, to our beautiful UPI campus in the city of Bandung. It is quite an honor for the Indonesia University of Education to host the World Association of Lesson Studies International Conference 2014. This conference is made possible through the cooperation between the Indonesia University of Education (UPI), Bandung City Office of Education, West Java Provincial Office of Education, Directorate of Higher Education, World Association of Lesson Studies (WALS), and Japan International Cooperation Agency (JICA). UPI has been the pioneer of the development of *Lesson Study* since 2006 together with JICA through the SISTTEMS Project (Strengthening In-service Teacher Training of Mathematics and Science at Secondary Level) and PELITA (Quality Improvement of SMP/MTs). At the beginning, we assigned 32 FPMIPA lecturers to collaborate with 500 mathematics and science teachers in 94 Junior High Schools to carry out innovation in mathematics and science learning through hands-on, mind-on, daily life by utilizing local materials as teaching materials in Sumedang District, West Java. Training teachers through lesson study puts more emphasizes on empowering teachers collegially than on instructing them to implement models of instruction. In Lesson Study, teachers and university lecturers collaboratively analyze teaching and learning through the cycle of *Plan, Do, See* to improve the quality of teaching and learning. From Sumedang District, we learned valuable lessons from the SISTTEMS Project that, among others, teacher improved their self-confidence and accountability in facilitating student's learning, collaboration between teachers and school leaders improved significantly, teaching and learning shifted from teacher-centered toward student-centered, teachers became more sensitive to and aware of students' learning problems, students were facilitated to learn collaboratively, student achievement gradually improved, and school image in the community improved significantly. Eventhough external supports have already ended, the schools in Sumedang District still continue to implement *Lesson Study* because the community realize the positive impacts of the practice of *Lesson Study*. Learning from the success of the implementation of *Lesson Study* in Sumedang District as a form of teacher professional development, UPI has expanded the target areas for *Lesson Study* in Indonesia. From 2008 to 2010, with the supports from Sampoerna Foundation, UPI trained 1500 teachers of mathematics, science education, Bahasa Indonesia, and English subjects in Karawang District (West Java province), Surabaya City, and Pasuruan District (East Java province). Since 2010, with the supports from the Directorate of Higher Education and the West Java Provincial Office of Education, UPI has trained 7,000 teachers of elementary, junior high, and senior high schools, and headmasters, and supervisors in 10 districts throughout the West Java province. In 2013, through the collaboration with the Government of Jambi Province, UPI trained 5,000 teachers of elementary, junior high, and senior high schools in 10 districts in Jambi province. In addition, UPI has also implemented the practice of *Lesson Study* to improve university courses in pre-service programs. We would like to extend our thanks and appreciation to all parties that have supported the organization of WALS International Conference 2014. Through this conference, let us strengthen our international network to share experiences and learn from each other to improve the quality of education through *Lesson Study*. We wish you all a fruitful and enjoyable WALS International Conference 2014!

Bandung, 24 November 2014



Prof. Dr. Sunaryo Kartadinata, M.Pd.
Rector,
Indonesia University of Education
(Universitas Pendidikan Indonesia)

On behalf of the Government of the Republic of Indonesia, I happily welcome all the participants of the WALS (World Association of Lesson Studies) Conference from various countries. Welcome to Bandung, Indonesia! In this 21st century, we are facing a complex global competition characterized by the rapid development of technology and multicultural society, and therefore education should provide our students with life skills and career skills having characteristics of flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility. To help develop those skills, learning should be carried out in such a way that it can support creativity and innovation, critical thinking and problem solving, communication and collaboration, and information, media and ICT literacy. Therefore, the Government of Indonesia has revised the previous curriculum and developed a new curriculum known by Curriculum 2013 to be implemented comprehensively in 2014. Curriculum 2013 puts emphasis on learning processes because we believe that quality learning processes will result in quality student's achievement too. In learning, students must be facilitated to be able to build knowledge, not to be told. Consequently, the challenge for educators in the primary and secondary levels, and in the university level as well, is to change the paradigm in the classroom from teaching to learning. To implement the new curriculum, we have provided student's book, teacher's book, and we have trained the teachers, principals, and supervisors for one week in all levels of education. The one week training was meant for the socialization of the new curriculum which, afterwards, has to be followed up with continuous lesson studies.

Lesson study is a strategy to improve the quality of teaching and learning through studying the teaching and learning processes continuously by empowering teacher's potentials collaboratively and collegially. Lesson study emphasizes student-centered learning and trains high order thinking skills through daily life approach as well as utilizing local materials. Lesson study also functions as a continuous professional development. Lesson study activities are usually carried out at school so that these activities are relevant and are based on real classroom activities. The Government appreciates all the teachers who have implemented lesson study and we hope that the implementation of lesson study will improve the quality of classroom teaching and learning, and it ultimately will improve the quality of education in the country.

Lesson Study has been introduced in Indonesia since 2006 through the technical cooperation under the support from JICA. Although the supports from JICA ended in 2011, the practice of lesson study did not stop. Lesson study continued in various regions supported by regional government and universities. However, lesson study activities still need to be improved so that lesson study can affect the improvement of the quality of education in Indonesia. WALS 2014 conference organized by UPI has to be used well as a forum for learning from each other and for network building among educators from all over the world.

Last but not least, we would like to thank World Association of Lesson Studies (WALS) and UPI for organizing WALS 2014 conference. We hope that all participants of WALS 2014 conference will obtain invaluable lessons to improve the quality of education their own country.

We wish you a fruitful and enjoyable conference!



Prof. Dr., Muhammad Nasir, Ph.D
Minister of Higher Education, Research and
Technology

CONTENT

TABLE OF CONTENT	
PREFACE	
WELCOME MESSAGE	
TABLE OF CONTENT	
THE ENGLISH TEACHERS' PERCEPTION OF LESSON STUDY	1
DEVELOPING A MODEL OF MICROTEACHING LESSON STUDY FOR ENGLISH STUDENT TEACHERS	6
LESSON STUDY, A TRAINING APPROACH TO STRENGTHEN THE PROFESSIONAL COMPETENCE OF TEACHERS IN SENEGAL	12
EFFECTIVENESS TRAINING PROGRAM TEACHES IN PREPARING TEACHERS FOR TECHNICAL EDUCATION MODEL BASED ON CONTEXT, INPUT, PROCESS AND PRODUCT	18
THE DEVELOPMENT OF LESSON STUDY IN MALAYSIA	29
THE DEVELOPMENT OF GENETICS GUIDED INQUIRY LEARNING TOOLS FOR BLENDED LEARNING THROUGH LESSON STUDY	35
THE IMPLEMENTATION OF STUDENTS ACHIEVEMENT DIVISION (STAD) COMBINED WITH LESSON STUDY-BASED MIND MAPPING IN GENERAL BIOLOGY COURSE TO IMPROVE MOTIVATION AND CONCEPT COMPREHENSION OF STUDENTS IN UNIVERSITY OF MUHAMMADIYAH MALANG	41
DEVELOPING ERIES LEARNING MODEL TO IMPROVE STUDENTS-TEACHER BASIC TEACHING SKILLS THROUGH THE IMPLEMENTATION OF LESSON STUDY	47
THE USE OF SILENT WAY METHOD AND COOPERATIVE LEARNING IN OPTIMIZING LESSON STUDY BY UTILIZING PLAIN MEDIA AS LEARNING INNOVATION	53
AN INVESTIGATION TO NOVICE ENGLISH TEACHERS' SELF-CONSIDERATION UPON THEIR DECISION OF JOINING TEACHER STUDY GROUP: A CASE STUDY IN BANDAR LAMPUNG, INDONESIA	69
LESSON STUDY IN PRIMARY SCIENCE: THE STORY OF GAGAS CERIA SCHOOL	73
THE CHANGES OF THINKING PROCESS IN PLANNING MATH LESSON THROUGH LESSON STUDY	78
LESSON STUDY CYCLE: DESIGNING AND EVALUATING A MODEL KIT	84
TEACHERS AS RESEARCHERS THROUGH LESSON STUDY: LESSONS LEARNED IN DEVELOPING STUDENTS UNDERSTANDING OF CHARACTER TRAITS IN THE SINGAPORE PRIMARY ENGLISH CURRICULUM	90
PROGRAMMED ASSISTANCE WITH LESSON STUDY IN MATHEMATICS LEARNING IN JUNIOR HIGH SCHOOL BASED ON THE CURRICULUM 2013	115
CHANGES IN MATHEMATICS LESSON: INSIGHTS FROM MALAYSIAN TAMIL PRIMARY SCHOOLS' LESSON STUDY PROCESS	122
ANALYZING THE EFFECTIVENESS OF TEACHERS CLASSROOM ASSESSMENT TECHNIQUES FOR STUDENTS LEARNING IN IMPLEMENTING LESSON STUDY	130
THE IMPACT OF LESSON STUDY ON THE IMPROVEMENT OF MATHEMATICS INSTRUCTION THE CASE OF UPI -PRIMARY LAB SCHOOL	140
USING LESSON ANALYSIS AS TEACHER SELF-REFLECTION AT DAILY LESSONS	148
THE DEVELOPMENT AND APPLICATION OF ELECTRONIC PORTFOLIO USING LESSON STUDY FOR IMPROVING LECTURERS' PROFESSIONALISM IN CELL BIOLOGY TEACHING AND LEARNING	152
THE USE OF LESSON STUDY AS PROFESSIONAL DEVELOPMENT FOR DIFFERENTIATING MATHEMATICS INSTRUCTION IN INDONESIAN PRIMARY SCHOOLS	160

TABLE OF CONTENT

MATERI BANGUN DATAR DAN BANGUN RUANG DENGAN MENGGUNAKAN ALAT PERAGA UNTUK MENINGKATKAN KREATIVITAS MAHASISWA SEMESTER I TAHUN AKADEMIK 2013/2014	168
GLOBAL STANDARD: ITS PURPOSE, PRINCIPLES AND FRAMEWORK	178
LESSON STUDY: AN IMPLEMENTED INNOVATION IN THE THAI CONTEXT	182
THE IMPLEMENTATION LESSON STUDY IN ASSISTANCE FOR PRIMARY TEACHERS ON DEVELOPING DEVICES LEARNING AT ELEMENTARY SCHOOL	198
LOCATING OPPORTUNITIES FOR LEARNING TO TEACH IN LESSON STUDY	203
KONSEP 'PADI' DALAM PENULISAN KARANGAN NARATIF	213
STUDY ON THE FACTORS FOR SUSTAINABLE DEVELOPMENT OF THE SCHOOL-BASED PRACTICAL RESEARCHES : <i>WITH USAGE OF THE THEORIES ON PROFESSIONAL LEARNING COMMUNITIES (PLCS)</i>	231
THE EXPERIENCE OF MATHEMATICS TEACHERS AS A MODEL TEACHER IN THE LESSON STUDY ACTIVITIES IN THE WEST PART OF BANDUNG CITY, INDONESIA	235
PENGAJARAN BERDASARKAN AKTIVITI DRAMA DALAM MENINGKATKAN PENCAPAIAN DAN MOTIVASI PELAJAR BERASAKAN 'TEACHING FOR REAL'	243
<i>BUILDING LEARNING COMMUNITY THROUGH LESSON STUDY APPROACH DURING PRACTICAL TEACHING</i>	251
WRITING MATHEMATICS JOURNAL TO IMPROVE THE ABILITY OF THINKING SKILL AND TO COMMUNICATE THE REASONING	256
TEACHERS' REFLECTION IN LESSON STUDY PROCESS: A PRELIMINARY ANALYSIS	261
THE RELATIONSHIP BETWEEN 'LESSON STUDY' AND NOVICE TEACHERS PROFESSIONALISM: A CASE STUDY OF A MENTORING PROGRAM IN SECONDARY EDUCATION IN INDONESIA	267
SUSTAINABILITY OF LESSON STUDY IN BASECAMP F SMPN1 TOMO SUMEDANG DISTRICT	277
JOURNEY OF WRITING A REFLECTIVE JOURNAL	281
EFFORT TO SUPPORT THE PREPARATION OF PROFESSIONAL BIOLOGY TEACHER CANDIDATES THROUGH INTEGRATION BETWEEN MICROTEACHING AND BASIC SKILLS OF TEACHING COURSE	285
TEACHER PERFORMANCE AND STUDENT MOTIVATION IMPROVEMENT THROUGH SCHOOL-BASED LESSON STUDY (LSBS) IN SMA NEGERI 1 CIPEUNDEUY KABUPATEN BANDUNG BARAT	290
PENGALAMAN BERHARGA DARI LESSON STUDY BAGI GURU-GURU IPA DI KABUPATEN SUBANG	298
LESSON STUDY ON ICT-INTEGRATED LESSONS: THE SINGAPORE CONTEXT	307
DIFFERENCES BETWEEN A TEACHER'S AND CHILDREN'S RECOGNITION TO CLASSROOM RULES THE PROCESS OF REMOVING THE DIFFERENCES IN A FIFTH GRADE CLASS	313
ENDOGENOUS DEVELOPMENT OF PROFESSIONAL GROUP THROUGH LESSON STUDY <i>EXPERIENCE IN ZAMBIA ON THE FORMATION OF KYOZAI-KENKYU TEAM</i>	334
LESSON STUDY IN INITIAL TEACHER EDUCATION OPENING THE DOOR TO A HOLISTIC UNDERSTANDING OF WHAT IT MEANS TO BE A TEACHER	345
THE EFFECTS OF VISUAL AND SOUND INFORMATION OF ENGLISH ON THE IMPROVEMENT OF ENGLISH SKILLS	351
THE SUPPORTING OF SCHOOL-BASED LESSON STUDY (LSBS) TO TEACHER PERFORMANCE APPRAISAL (PKG) AND TEACHER'S CONTINUOUS PROFESSIONAL DEVELOPMENT (PKB) IN SMAN 9 BANDUNG	354

TABLE OF CONTENT

SCHOOL-BASED LESSON STUDY TO SUPPORT THE GOVERNMENT IN SUCCEEDING THE PERFORMANCE APPRAISAL OF TEACHERS IN SMPN 1 JATIGEDE SUMEDANG WEST JAVA INDONESIA	359
IMPLEMENTATION OF LESSON STUDY FOR TRAINEE TEACHER OF NAUTICAL PROGRAM AT VOCATIONAL SCHOOL SMKN 13 MALANG	363
THE EFFECTS OF "INTERSUBJECT TEACHING" - IN THE CASE OF COOPERATIVE TEACHING BETWEEN AN ENGLISH CLASS AND A PHYSICS CLASS	367
REFLECTION ON LESSON STUDIES FOR TEACHERS' PROFESSIONAL COMMUNITY A CASE STUDY OF A JAPANESE ELEMENTARY SCHOOL	369
SENIOR HIGH STUDENTS PSYCHOLOGICAL PROBLEMS IN SPEAKING ENGLISH AS FOREIGN LANGUAGE A SURVEY IN A SENIOR HIGH SCHOOL IN BANDUNG	373
THE EFFECT OF IMPLEMENTATION LESSON STUDY AT ENVIRONMENT SCIENCE COURSE	379
THE USE OF TRADITIONAL GAMES FOR BUILDING YOUNG LEARNERS' COOPERATIVE SKILL (AN EXPERIMENTAL RESEARCH ON THE FIFTH GRADE STUDENTS OF SD NEGERI KUDAILE 04 OF TEGAL REGENCY)	282
A CASE STUDY : TRAINING OF WOMEN AND CHILDREN FOR OWNERSHIP OF THEIR RIGHTS	390
THE DEVELOPING OF THE GRADUATES' PROFESSIONALISM AT UNIVERSITIES: THE ROLE OF UNIVERSITIES IN BRIDGING KNOWLEDGE INTO WORKPLACE	394
ASSESSING STUDENTS' STATISTICAL REASONING	401
A STUDY ON STUDENTS' MISCONCEPTION ABOUT CHEMICAL EQUILIBRIUM SUBJECT AT A SENIOR HIGH SCHOOL	408
THE DEVELOPMENT OF EXPERENTIAL LEARNING MODEL IN ENTREPRENEURSHIP COURSE	421
THE APPLICATION OF KAULINAN BARUDAK IN LESSON STUDY APPROACH AS A STIMULATOR TO DEVELOPMENT STUDENTS' EMOTIONAL INTELLIGENCE	429
THE ART OF CONNOTATION FOR VISUAL TEXTS THROUGH LESSON STUDY: A COLLABORATION BETWEEN TWO SCHOOLS IN SINGAPORE	433
PROPOSAL OF NEW ENGINEERING EDUCATION AIMING AT INNOVATIVE PRODUCTS IN THE GLOBALIZATION ERA	438
DRAMATIC PLAY ACTIVITY AS A STRATEGY TO DEVELOP CHILDREN UNDERSTANDING IN DINOSAURS' EXTINCTION A CASE STUDY AT GAGASCRERIA PRESCHOOL	447
DRAMATIC PLAY ACTIVITY AS A STRATEGY TO DEVELOP CHILDREN UNDERSTANDING IN DINOSAURS' EXTINCTION A CASE STUDY AT GAGASCRERIA PRESCHOOL	497
LESSON STUDY IN APPLICATION OF FACULTY OF MATHEMATICS AND NATURAL SCIENCE UNDIKSHA FOR DEVELOPMENT HIGHER ORDER COMPETENCE AND LOCAL WISDOM AND LOCAL GENIUS	453
IMPROVING STUDENTS' INTERACTIONS IN LEARNING MATHEMATICS THROUGH LESSON STUDY	457
LESSON STUDY SOLUTION OF LEARNING ECONOMIC IMPROVEMENT IN SMAN 1 WRINGINANOM GRESIK	464
IMPLEMENTATION OF LESSON STUDY IN TEACHING ASSESSING LEARNING (CASE STUDY AT BIOLOGY DEPARTMENT THE EDUCATION FACULTY OF ALMUSLIM UNIVERSITY)	468
THE DEVELOPMENT OF LEARNING DEVICES OF THE ENVIRONMENTAL SCIENCE COURSE THROUGH LESSON STUDY ACTIVITIES	473
IMPROVING THE STUDENTS' ABILITY IN CRITICAL THINKING AT MECHANICS SUBJECT THROUGH LESSON STUDY	481
IMPLEMENTATION OF LESSON STUDY TO INCREASE STUDENT'S ABILITY IN READING AND HIGH LEVEL THINKING	488

TABLE OF CONTENT

REFLECTION OF LESSON STUDY APPROACH BY PRE-SERVICES SCIENCE TEACHER DURING PRACTICUM AT SELECTED SCHOOL	492
THE IMPROVEMENT OF CLINICAL CAPABILITY LEARNING FOR MIDWIFERY STUDENTS	499
THE IMPLEMENTATION OF LESSON STUDY ON CHEMISTRY TEACHERS OF HIGHER SCHOOL IN PALEMBANG AND LUBUK LINGGAU	502
THE IMPROVEMENT OF STUDENTS' CRITICAL THINKING ON EMBRYOLOGY AND ANIMAL REPRODUCTION COURSE THROUGH LESSON STUDY IN BIOLOGY EDUCATION	509
EMPOWERING METACOGNITIVE KNOWLEDGE THROUGH BIOLOGY LEARNING BASED ON LESSON STUDY	517
INCREASING THE ACTIVITY OF LEARNING AND CREATIVITY OF TEACHING	521
IMPLEMENTATION OF LESSON STUDY IN ENHANCING OF STUDENT LEARNING ACTIVENESS ON THE DISCREET MATHEMATICS SUBJECT IN MATHEMATICS EDUCATION STUDY PROGRAM OF AHMAD DAHLAN UNIVERSITY	524
REFLECTION QUALITY DETERMINES THE QUALITY AND SUSTAINABILITY OF LESSON STUDY IN SMK NEGERI 1 SUBANG	529
THE IMPLEMENTATION OF PAIR WORK METHOD IN TEACHING GRAMMAR III THROUGH LESSON STUDY ACTIVITY AT STKIP PGRI PASURUAN	534
IMPROVING STUDENTS' SCIENTIFIC ABILITY THROUGH LESSON STUDY-BASED MATHEMATICS LEARNING	537
ENHANCING STUDENTS' SELF-CONFIDENCE THROUGH TEACHER'S BEHAVIOUR CHANGE ON LESSON STUDY PROGRAM FOR TEYL 1	540
USING COOPERATIVE LEARNING AND PEER ASSESSMENT TO ENHANCE STUDENTS' ABILITY IN PUBLIC SPEAKING AND TO ACTIVATE LEARNING IN SPEAKING IV CLASS	546
LESSON STUDY: COMPARISON STUDY OF THE GRAPH THEORY LEARNING TOWARD STUDENTS LEARNING OUTCOME	553
COMBINATION OF PROBLEM-BASED LEARNING AND LOVE IMPLEMENTATION IN LESSON STUDY ACTIVITY TO IMPROVE STUDENTS' LEARNING RESULT	557
LESSON STUDY MAKES CONTEXTUAL LEARNING MORE DIRECTED IN ENGLISH LEARNING FOR 4TH GRADERS IN SD GAGASCERIA	563
ENHANCEMENT LEARNING ACTIVITIES AND STUDENTS UNDERSTANDING BY WAY OF LESSON STUDY IN TAXONOMY OF VASCULAR PLANTS AT BIOLOGY EDUCATION DEPARTMENT UNIVERSITAS MUHAMMADIYAH BENGKULU	567
CHALLENGES TO THE IMPROVEMENT OF TEACHING AND LEARNING PRACTICES THROUGH ACTION RESEARCH <i>GROUP WORK ACTIVITY IN SENEGAL</i>	573
BUILDING BLOCKS, STUMBLING BLOCKS -STUDENT RESPONSES IN UNDERSTANDING THE POINT, LINE AND PLANE THROUGH DIALOGUE	587
THE DEVELOPMENT OF LESSON STUDY PLANNING IN BAHASA INDONESIA SUBJECT AT GAGASCERIA ELEMENTARY SCHOOL	593
THE EFFECTIVENESS OF TEACHING LEARNING PROCESS THROUGH SEATING ARRANGEMENT, INNOVATIVE TEACHING LEARNING METHOD AND TASK DISTRIBUTION IN LESSON STUDY ACTIVITY	596
IMPROVING STUDENT'S WRITING SKILL IN THE GENRE-BASED WRITING THROUGH PROCESS ORIENTED APPROACH	599
IMPROVING CRITICAL THINKING SKILLS AND STUDENT LEARNING OUTCOMES IN THE PUBLIC ECONOMICS COURSES BY USING PROBLEM BASED LEARNING MODEL APPROACH	606
AN ACTION RESEARCH STUDY ON USING ELEGANT TASKS FOR PRIMARY ONE PUPILS TO LEARN ART	611

TABLE OF CONTENT

EMPOWERING STUDENTS' AUTONOMY IN LEARNING TEFL SUBJECT THROUGH LESSON STUDY A STUDY CONDUCTED TO 6TH SEMESTER STUDENTS OF ENGLISH EDUCATION STUDY PROGRAM OF FKIP UNPAK	622
LESSON STUDY IN TEACHING PRACTICUM: A CASE STUDY	627
INFUSING NARRATIVE AND REFLECTIVE ELEMENTS IN ARGUMENTATIVE WRITING	633
MENINGKATKAN KUALITAS PROSES PEMBELAJARAN BILANGAN BERPANGKAT DAN BENTUK AKAR MELALUI PERMAINAN KARTU BILKAT (<i>KAJIAN TERHADAP OPEN LESSON DUA SIKLUS KELAS VII PADA LESSON STUDY BERBASIS SEKOLAH DI SMP NEGERI 1 TOMO</i>)	638
IMPROVEMENT OF COLLABORATIVE ACTIVITIES IN WORKING GROUP WITH GROUP IN GROUP LEARNING MODEL IN CARTOGRAPHY COURSE OF GEOGRAPHY EDUCATION PROGRAM FIS UNP	645
THE IMPLEMENTATION OF LESSON STUDY AT STRATEGY IN MATHEMATICS INSTRUCTION LECTURE	649
REPERSONALIZE BY TEACHER TO IMPROVE THE QUALITY OF LEARNING IN MATHEMATICS: CUBOID VOLUME IN 5TH GRADE	652
UNDERSTANDING STUDENTS' OBSTACLES IN READING COMPREHENSION EFL LESSON STUDY AT GAGAS CERIA PRIMARY SCHOOL, BANDUNG, INDONESIA	656
LESSON STUDY-BASED TERJUN TULIS SAJI (TTS) FOR IMPROVING SCIENTIFIC LITERACY OF CLASS X STUDENTS	662
THE INDONESIAN 2013 CURRICULUM IMPLEMENTATION: UNDERSTANDING AND BARRIERS	672
CONNECTING CONTENT AND CHILDREN CONTEXTUAL LIFE WITHIN GAGAS CERIA PRESCHOOL CLASSROOM ACTIVITIES	678
TITLE: SAME C-P-A APPROACH, DIFFERENT PRACTICE TYPES OF PAPER: CASE STUDY OF PRACTICE STRAND: PEDAGOGIES AND TEACHING STRATEGIES	682
USING ONLINE TOOL "POPPLER" TO TEACH PRIMARY 5 CHINESE COMPOSITION WRITING	688
IMPROVING THE QUALITY OF THEMATIC SCIENTIFIC LEARNING BASED ON SOFT SKILL THROUGH LESSON STUDY IN ELEMENTARY SCHOOL	693
COMMUNICATION IN TEACHING AND LEARNING MATHEMATICS AMONG STUDENTS IN RURAL AREA	698
EFFECTIVENESS OF WHOLE WORD READING APPROACH FOR STUDENT WITH LEARNING DISABILITIES	700
AMALAN REFLEKSI DALAM PENGHASILAN INOVASI PENGAJARAN –PEMBELAJARAN DI KALANGAN GURU PELATIH SAINS INSTITUT PENDIDIKAN GURU KAMPUS TAWAU	707
CHALLENGES AND OPPORTUNITIES IN IMPLEMENTING PROBLEM BASED LEARNING (PBL) MODEL IN MATHEMATICS CLASSROOM THE CASE OF NINTH GRADE MATHEMATICS AT LABORATORIUM SCHOOL IN INDONESIA UNIVERSITY OF EDUCATION (UPI)	714
PENGGUNAAN NEWSMAKER DALAM MEMBINA KEMAHIRAN BERTUTUR	723
CRITICAL THINKING IN ARGUMENTATIVE ESSAY WRITING	744
USING HIT BOTTLE GAME TO IMPROVE ENGLISH VOCABULARY MASTERY OF THE NINTH GRADERS	751
TEACHER'S LEARNING ON SEATING ARRANGEMENT: A CASE STUDY OF ASSESSMENT IN LEARNING	754
SCHOOL BASED LESSON STUDY: AN INVESTIGATION OF PRACTICE, ACHIEVEMENT AND CHALLENGES IN AN INDONESIAN JUNIOR SECONDARY SCHOOL SCIENCE TEACHERS	760
DECREASING TEACHER'S BURDEN IN DESIGNING FUN LEARNING THROUGH LESSON STUDY	772
DYNAMIC INTELLECTUAL LEARNING AS AN ADAPTIVE LEARNING MODEL IN LESSON STUDY	778

TABLE OF CONTENT

ENGAGING IN LESSON STUDY TO GAUGE INSTRUCTION OF THE FUNDAMENTAL COUNTING PRINCIPLES AS AN INTRODUCTORY TOPIC ON PROBABILITY	782
IMPROVING STUDENTS' CREATIVE THINKING THROUGH PROBLEM POSING IN LEARNING LINEAR ALGEBRA	795
SCHOOL BASED LESSON STUDY: AN INVESTIGATION OF PRACTICE, ACHIEVEMENT AND CHALLENGES IN AN INDONESIAN JUNIOR SECONDARY SCHOOL SCIENCE TEACHERS	799
USING TEACHER SELF REFLECTION ON TEACHER PERFORMANCE ASSESSMENT	811
PENGUNAAN PEMBELAJARAN TERARAH SECARA KENDIRI DAN PEMBELAJARAN KOLABORATIF DALAM PENULISAN KARANGAN NARATIF DENGAN MENGGUNAKAN SIMPULAN BAHASA UNTUK MURID DARJAH 4	821
AN EVOLVING RESEARCH MATHEMATICS LESSON THROUGH LESSON STUDY	833
EFFECTIVENESS OF LESSON STUDY TO IMPROVE THE QUALITY OF TEACHING IN BANGLADESH THE ANALYSIS FOCUSES ON CHANGES OF THE LESSON	842
IMPROVING STUDENTS' ACTIVITY AND LEARNING ACHIEVEMENT THROUGH THE USE OF COOPERATIVE LEARNING MODEL IN A LESSON STUDY ENRICHED WITH LOCAL WISDOM AND ENTREPRENEURSHIP: A CASE STUDY IN THE COURSE OF COUNSELING FOR CHILDREN WITH SPECIAL NEEDS	859
HOW PLC HELPED IMPROVE THE LEARNING AND TEACHING OF ENGLISH IN SK SEREMBAN 2B THAT LEAD TO THE IMPROVEMENT OF STUDENTS' ACADEMIC RESULTS	864
AN IMPLEMENTATION OF SCIENTIFIC APPROACHES BY USING <i>PBMP</i> PATTERN IN IMPLEMENTING CURRICULUM 2013 THROUGH A PARTICIPATION-BASED LESSON STUDY FOR BIOLOGY TEACHERS OF SENIOR HIGH SCHOOLS IN MALANG MUNICIPALITY	867
STRENGTHENING TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPCK) OF PRESERVICE AND INSERVICE BIOLOGY TEACHER THROUGH LESSON STUDY	875
TITLE: REFLECTIONS OF THE TEACHER IMPLEMENTERS TYPES OF PAPER: RESEARCH PAPER STRAND: ISSUES ABOUT LEADING LESSON AND LEARNING STUDY	885
10'M AKSARA MOVING ON	891
INNOVATIVE LEARNING FOR ENTREPRENEURSHIP USING LESSON STUDY FOR VOCATIONAL SCHOOL	896
PENGEMBANGAN MEDIA PEMBELAJARAN GERAK PADA TUMBUHAN MELALUI KEGIATAN LESSON STUDY CLUB DI KABUPATEN PASURUAN UNTUK MENINGKATKAN KETERAMPILAN SAINS DAN BERPIKIR KRITIS PESERTA DIDIK	899
THE STUDY OF THE IMPACT OF PELITA PROGRAM IN THE PROVINCES OF WEST JAVA, WEST SUMATERA, SOUTH KALIMANTAN, EAST JAVA, AND NORTH SULAWESI, INDONESIA	904
PREDICTIVE VALIDITY OF IPP GRADES AND APTITUDE TEST SCORES OF LEARNING ACHIEVEMENT OF ELEVENTH GRADE STUDENTS OF SENIOR HIGH SCHOOL	914
THE IMPLEMENTATION OF LESSON STUDY TO ENHANCE THE ACTIVITY AND THE CAPABILITY OF STUDENT CRITICAL THINKING IN VERTEBRAL ZOOLOGY COURSE	940
THE COMPARISON OF MATHEMATICAL UNDERSTANDING AND CONNECTION THROUGH COGNITIVE CONFLICT OF PIAGET AND HASWEH	944
TEACHER'S LEARNING ON SEATING ARRANGEMENT: A CASE STUDY OF ASSESSMENT IN LEARNING	950
EMPOWERING PRIMARY TEACHERS ON CREATING SUB-THEMS OF INDONESIA "2013 CURRICULUM"	956
THE IMPLEMENTATION OF STUDENTS ACHIEVEMENT DIVISION (STAD) COMBINED WITH LESSON STUDY-BASED MIND MAPPING IN GENERAL BIOLOGY COURSE TO IMPROVE MOTIVATION AND CONCEPT COMPREHENSION OF STUDENTS IN UNIVERSITY OF MUHAMMADIYAH MALANG	962
DO STUDENTS REALLY PERFORMED LIKE A SCIENTIST? <i>USING STUDENTS FEEDBACK TO IMPROVE A NATIONAL CURRICULUM</i>	968



TABLE OF CONTENT

THE LECTURER ASSISTANT IN STUDENT OF MIDWIFERY CLINICAL PRACTICE OF YOGYAKARTA MIDWIFERY ACADEMY IN THE YEAR OF 2013	972
CLASS MANAGEMENT AND TEACHER ANALYSIS: AN ACTION RESEARCH LESSON STUDY	977
TEACHER-STUDENT COLLABORATION IN SOLUBILITY PRODUCT CONSTANT AND COLLOID CONCEPT IN CHEMISTRY LEARNING OF SENIOR HIGH SCHOOL	979
REALIZING LEARNER-CENTERED LESSON THROUGH LESSON STUDY: ZAMBIAN EXPERIENCE IN AFRICAN CONTEXT	983
INTERPRETING KNOWLEDGE CREATION IN LESSON STUDY	991
A LESSON STUDY NETWORK IN BANDUNG: FOCUSING ON DESIGNING TEACHING AND LEARNING	998
LESSON STUDY: A NON-INSTANTANEOUS VALUABLE EXPERIENCE	1001
FUSION WITH CHILDREN: THE LESSON STUDY CLUB	1007
PATTERN ASSESSMENT LEARNING SCIENCE IN LESSON STUDY OF WEST JAVA AND AUTHENTIC ASSESSMENT CURRICULUM DEVELOPMENT CLAIMS 2013	1009
IMPROVING SELF-HELP READING THROUGH PEER REVIEW	1015
INCREASING STUDENTS SENSITIVITY TOWARD ENVIRONMENTAL PROBLEMS AND IT'S IMPLEMENTATION TO BUILDING RESEARCH PROPOSAL TROUGHT PROJECT BASED LEARNING (PJBL)	1023
LESSON STUDY (LS) IN NICARAGUA	1030
PATHWAYS TO PROFESSIONAL LEARNING: LESSON STUDY AT GAGASCERIA PRESCHOOL	1034
SKILLS IN DESIGNING AND IMPLEMENTING 5-E MULTI-MODEL LEARNING THROUGH CRAFT MODEL TRAINING ON LESSON STUDY BASED SCIENCE TEACHER ASSOCIATION AT STATE JUNIOR SECONDARY SCHOOL IN KENDARI CITY	1039
APPLICATION OF BLENDED LEARNING IN CHEMISTRY	1045
IMPROVEMENT OF STUDENTS' ACTIVITIES IN LEARNING THROUGH DISCUSSION USING LEVELING STUDENT WORKSHEET STRATEGY (LESSON STUDY BY TAKING THE OBJECT OF CALCULUS I COURSE IN SEMESTER 2)	1048
ALGEBRAIC MANIPULATION	1056
IMPLEMENTATION OF LESSON STUDY TO IMPROVE COMPETENCES OF LECTURERS	1084
SPECIAL TEACHER FOR SPECIAL CHILDREN: <i>PERSPECTIVE OF PROFESIONALIZATION GIFTED TEACHER</i>	1091
STUDENTS' ACTIONAL COMPETENCE REFLECTED THROUGH GENRE: TRANSFORMING NARRATIVE INTO DRAMA SCRIPT <i>A DESCRIPTIVE STUDY ON GRADE VIII STUDENTS</i>	1097
A LESSON STUDY IMPLEMENTATION: APPLICATION INQUIRY STRATEGY ON OOPERATIVE LEARNING TO ENHANCE SIXTH GRADE STUDENT'S ANALYSIS OF ELECTRIC CIRCUIT	1109
USING <i>BOTAKOJA</i> TO IMPROVE THE QUALITY OF STUDENTS' STORYTELLING ABILITY IN ORAL EXPRESSION CLASS	1117
ENGAGING 3NT STUDENTS IN THE LEARNING OF ELECTRONICS THROUGH THE ACE ELECTRONICS BOARD	1123
KNOWLEDGE MANAGEMENT MODEL IN MANAGERIAL COMPETENCE DEVELOPMENT FOR SMALL INDUSTRY BUSINESSAT WEST JAVA PROVINCE, INDONESIA	1134
TEACHER-STUDENT COLLABORATION IN SOLUBILITY PRODUCT CONSTANT AND COLLOID CONCEPT IN CHEMISTRY LEARNING OF SENIOR HIGH SCHOOL	1143

Improving Students’ Scientific Ability through Lesson Study-Based Mathematics Learning

Dian Kurniati

*Faculty of Teacher Training and Education, Jember University, Jl. Kalimantan No 37 Jember, East Java, Indonesia
dian.kurniati82@gmail.com*

Abstract: Students’ scientific ability is the main concern of every lesson carried out by teachers in Indonesia nowadays. Learning process based on students’ scientific ability was designed such that the students may construct the concept through observation step (to identify or find the problem), design the problem, give the hypothesis, collect the data, analysis the data, make the conclusion and communicate the funded concept. Therefore, improving students’ scientific ability will students’ ability in problem solving and develop students’ positive characters. In this study, three students from 7th grades SMP Negeri 1 Jember were randomly selected to observe their scientific ability. The observation was focused on how they were observing, questioning, associating, experimenting, and networking to solve some problems related to mathematics. Periodic observations were conducted during the open classes, one of the stages in the lesson study procedure, in each cycle conducted by the lesson study team members consisting of one teacher and three observers. There was an improvement in scientific ability from three selected students during the third open class compared to the first and the second open classes after reviewed collaboratively by the lesson study team members. In the first open class, two students couldn’t solve the problems correctly because they didn’t comprehend what was the given and which was asked in the problems. In the second open class, three students were able to solve the problems correctly but they couldn’t make the conclusion and communicate that result. However, in the third open class, three students could solve the problems by observing, questioning, associating, experimenting, and networking correctly. Therefore, it can be concluded that there was an improvement in students’ scientific ability after participating in the lesson study-based mathematics learning.

Keywords: Students’ Scientific Ability, Periodic observations, Mathematics Learning, Lesson Study.

1 INTRODUCTION

The curriculum in Indonesia has been changing and developing overtime and currently Indonesia has changed its curriculum from School Based Curriculum (SBC) to the 2013 curriculum. The government must have obtained a particular reason in changing the curriculum. Ministry of Education and Culture, Muhammad Nuh, stated that Indonesian education system should fit the demand of era. The currently used 2013 curriculum is expected to be a solution to improve human resources quality in Indonesia.

One of the fundamental changes in the 2013 curriculum is the approach used in the Teaching and Learning Process (TLP). The approach used in this new curriculum is scientific approach with five teaching and learning process steps. This approach is focused on how students are observing, questioning, associating, experimenting, and networking the learning material.

Scientific approach is intended to provide insight to students in recognizing and understanding various materials using a scientific approach that information can come from anywhere, anytime and does not always depend on the teacher’s information (Teacher

Centred Learning). Therefore, it is necessary to develop the students’ scientific ability, so that students are able to understand the learning material perfectly. However, many teachers find it difficult to design a study that can enhance students’ scientific ability. One of the teachers’ difficulties is that the teachers’ incapability in understanding the difficulties experienced by students in conducting scientific activity, especially in finding a mathematics concept. In this case, the teachers need the help of observers to help monitor the students’ scientific ability. The observer activity can be developed through lesson study.

Lesson study is a potent embedded peer-to-peer professional learning strategy. It requires teachers and other educators to work collaboratively and continuously based on the collegiality principles and mutual learning (Sumar Hendaya, et al: 2006). Through lesson study, teaching and learning process is developed by the community which then selecting one of the teachers to carry out the study, while other teachers observe students’ learning activities during the teaching and learning process. At the end of the activity, the teacher regroup and conduct a discussion to discuss the result of the teaching and learning process, revise and develop the next learning

program based on the result of the discussion. It is done to help the teacher to find a solution about the problems faced in the TLP. Based on the previous explanation, it is necessary to find a way to enhance the students’ scientific abilities, especially in mathematics. Hence, students’ scientific ability is the main concern of every lesson carried out by teachers in Indonesia nowadays. Learning process based on students’ scientific ability was designed such that the students may construct the concept through observation step (to identify or find the problem), design the problem, give the hypothesis, collect the data, analysis the data, make the conclusion and communicate the funded concept. Therefore, improving students’ scientific ability will students’ ability in problem solving and develop students’ positive characters.

2 RESEARCH METHODOLOGY

The three stages of the design implementation of lesson study in mathematics to improve students’ scientific ability broadly refers to the Lesson Study cycle according to Lewis, they are Plan, Do and See. The lesson study is carried out for three cycles, with each cycle is focused on observing the students’ scientific ability to solve some problems related to mathematics. The learning model designed in the first cycle refers to the students’ learning outcomes at the previous meeting, while the learning model used in the second cycle refers to the observers’ result in observing the students’ scientific ability in the first cycle. The third cycle is also designed based on the result of the observers’ observation on the students’ scientific ability. Therefore, through these steps, it is expected that problems or difficulties experienced by students can be solved.

In this lesson study, three students from 7th grades SMP Negeri 1 Jember were randomly selected to observe their scientific ability. The observation was focused on how they were observing, questioning, associating, experimenting, and networking to solve some problems related to mathematics. Observation made for the first, second and third lessons were recorded for three students, namely student A, B, and C.

According to Wragg (1999), observations can be regarded as a method of gathering classroom evidence because it embeds student’s actions and active learning process that describes and record what the students are doing. In this case, periodic observations were made on three students’ participation in scientific ability at predetermined time intervals of ten minutes during the lesson from 07.00 am to 08.20 am. Periodic observations were conducted during the open classes, one of the stages

in the lesson study procedure, in each cycle conducted by the lesson study team members consisting of one teacher and three observers. There was an improvement in scientific ability from three selected students during the third open class compared to the first and the second open classes after reviewed collaboratively by the lesson study team members.

3 RESULT AND DISCUSSION

Learning material used in the first cycle was “sample and population” and the learning material used in the second cycle was “Probability” while in the third cycle, the application of probability in everyday life was determined as the discussion material.

After reviewing the first and the second lesson, the lesson study team and the teachers involved discussed collaboratively the lesson content and learning activities as well as the classroom discussions. A new lesson plan that comprised of agreed lesson content and learning activities as well as the classroom discussions was determined and implemented.

The first meeting

1. Student A was able to identify what was given and which was asked in the problem. Sometimes he was able to identify what was given and which was asked in the problem after a seconds. Furthermore, he had been able to make a plan to solve the problem and communicate the reason for choosing the plan fluently and correctly. However, there were several steps of plan whereby he was able to give a reason for choosing such right after a seconds. Furthermore, he was able to do the calculations properly to obtain the proper solution of the problem.
2. Student B had not understood the whole sentences on the questions. Furthermore, he was able identify what was given and which was asked in the problem. Sometimes he was able to identify what was given and which was asked in the problem right after a seconds. Furthermore, he had been able to make a plan to solve the problems well. However, he sometimes could give reasons for choosing a plan, but the solution of the problem cannot be resolved correctly.
3. Student C had not understood the whole sentences on the questions. Furthermore, he was able to identify what was given and which was asked in the problem. Sometimes he was able to identify what was given and which was asked in the problem right after a seconds. However, he had been able to make a plan to solve the problem and communicate the reason for

choosing the plan fluently and correctly. He had also been able to do the calculations correctly, but the solution of the problem cannot be resolved well.

The second meeting

On the second problem, Student A was able to identify what was given and which was asked in the problem. Sometimes he was able to identify what was given and which was asked in the problem right after a seconds and with a less precise answer. Furthermore, he had been able to make a plan to solve and reason the problems fluently and correctly. Student A was also able to determine the solution of problems in the second meeting properly. However, he could not make the conclusion and communicate that result to his group, so could not Student B and Student C.

The third meeting

Student A said that he was able to understand the problems well. Furthermore, he was able to identify what was given and which was asked in the problem fluently and correctly. Sometimes he was able to identify what was given and which was asked in the problem right after a seconds. Furthermore, he had been able to make a plan to solve the problem and communicate the reason for choosing the plan fluently and correctly. In addition, he also changed the problem solving steps because he thought that the steps he set earlier was incorrect. Furthermore, he was able to do the calculation correctly to obtain the solution of the problem. After finding the solution of the problem, the student made the conclusion related to the problem and communicate that result to his group, so did Student B and Student C. However, Student B and Student C did feel so embarrassed that they were not able to communicate the conclusion of the problems well. It was caused by their uncertainty on their solutions.

Based on the analysis above, it is badly needed to have a change in teaching and learning process that

teachers should be more facilitating students to be more open when they experience problems. It must be done to improve students' confidence in delivering something.

4 CONCLUSIONS

There was an improvement in scientific ability from three selected students during the third open class compared to the first and the second open classes after reviewed collaboratively by the lesson study team members. In the first open class, two students couldn't solve the problems correctly because they didn't comprehend what was the given and which was asked in the problems. In the second open class, three students were able to solve the problems correctly but they couldn't make the conclusion and communicate that result. However, in the third open class, three students could solve the problems by observing, questioning, associating, experimenting, and networking correctly. Therefore, it can be concluded that there was an improvement in students' scientific ability after participating in the lesson study-based mathematics learning.

5 ACKNOWLEDGEMENTS

The author gratefully acknowledge the support of The Jember University and Mathematics Education Study Program. The author also deeply thanks to the Mathematics teacher and students of SMP Negeri 1 Jember and all lecturers in the author's department for their support.

6 REFERENCES

- Hendayana, S. dkk. (2006). *LESSON STUDY Suatu Strategi untuk Meningkatkan Keprofesionalan Pendidik*. UPI Press. Bandung.
- Wragg, E. C. (1999). *An introduction to classroom observation (2nd ed.)*. London, UK: Roulledge