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Yogyakarta, 18-20 May 2014

Global Trends and Issues on Mathematics and Sciences and the Education

PROCEEDING

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Conference Proceedings

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Global Trends and Issues
on Mathematics and Science
and The Education

Faculty of Mathematics and Natural Sciences
Yogyakarta State University

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- Mathematics & Mathematics Education
- Physics & Physics Education
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Preface

Bless upon God Almighty such that this proceeding on International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS) 2014 may be compiled according to the schedule provided by the organizing committee. All of the articles in this proceeding are obtained by selection process by the reviwer team and already ben presented in the Conference on 18 – 20 May 2014 in the Faculty of Mathematics and Natural Sciences, Yogyakarta State University. This proceeding consists of 344 parallel papers, and comprises 9 fields, that is mathematics, mathematics education, physics, physics education, chemistry, chemistry education, biology, biology education, and science education.

The theme of ICRIEMS 2014 is 'Global Trends and Issues of Mathematics and Science and the Education'. The main articles in this conference are given by five keynote speakers, which are Prof. Dean Zollman (Physics Department, Kansas State University), Prof. David F. Treagust (Center of Education, Curtin University), Prof. Dr. Amy Cutter-Mackenzie (School of Education, Southern Cross University, Australia), Prof. Tran Vui (Hue University, Vietnam), and Asst. Prof. Dr. Duangjai Nacapricha (Faculty of Science, Mahidol University). The conference is also supported by the LPTK (Lembaga Pendidikan Tenaga Kependidikan) Forum from Faculty of Mathematics and Sciences that consists of 12 universities all over Indonesia. Each member of the Forum contributed one invited speakers, such that there are an additional 10 invited speakers presenting in the forum. Besides the keynote and invited speakers, there are also 344 parallel articles that presented the latest research results in the field of mathematics and sciences, and the education. These parallel session speakers come from researchers from Indonesia and abroad, including Malaysia and Australia.

Hopefully, this proceeding may contribute in disseminating research results and studies in the field of Mathematics and Sciences and the Education such that they are accessible by many people and useful for the Nation Building.

Yogyakarta, June 2014

The Editor Team

Forewords from The Head of Committee

Assalamu'alaikum wa Rahmatullahi wa Barakatuh
May God bless upon us.

Your excellency The president of UNY Prof. Dr. Rochmat Wahab, M. Pd., M.A., ladies and gentlemen, good morning and welcome to State University Yogyakarta. This seminar entitled International Conference on Research, Implementation, and Education of Mathematics and Science (ICRIEMS): global trends and issues on mathematics and science and the education is organized by the Faculty of Mathematics and Science, State University of Yogyakarta working together with 12 members of the Association of the Faculty of Math and Sciences from Teacher Education Program (LPTK). This seminar is also dedicated to the golden aniversary of UNY; 1 among 90 academic activities dedicated to the aniversary.

Ladies and gentlemen, on behalf of the committee of this conference, I would like to express highest appreciation and gratitudes to the keynote speakers, including:

1. Prof. David F. Treagust (Center of Science Education Curtin University)
2. Prof. Dean Zollman (Physics Dept, Kansas University, US)
3. Dr. Amy Cutter-Mackenzie (School of Education, Southern Cross University, Australia)
4. Asst. Prof. Dr. Duangjai Nacapricha (Faculty of Science , Mahidol University)
5. Prof. Tran Vui (College of Education, Hue University, Hue City, Vietnam)

Secondly, I would like also to give sincere thanks and gratitudes to the speakers from 10 College of Educations, including:

1. Universitas Negeri Surabaya (UNESA): Prof. Dr. Muchlas Samani, and 33 speakers
2. Universitas Negeri Jakarta (UNJ): Prof. Dr. Gerardus Pola, and 7 speaker
3. Universitas Pendidikan Indonesia (UPI): Dr. Hary Firman, and
4. Universitas Negeri Malang (UM): Prof. Effendi, Ph.D
5. Universitas Negeri Padang (UNP): Prof. Tjeerd Plomp
6. Universitas Negeri Semarang (UNNES): Prof. Dr. Supriyadi Rustad

7. Universitas Pendidikan Singaraja (UNDIKSA): Prof. Dr. I Nengah Suparta, M.Si
8. Universitas Negeri Makasar (UNM): Oslan Junaidi, Ph.D
9. Universitas Negeri Gorontalo (UNG): Prof. Dr. Sarson Pomalto, M.Pd
10. Universitas Negeri Yogyakarta (UNY): Dr. Jaslin Ikhsan

Next, I also would like to thanks to our special guests and speakers from:
1. Universitas Pendidikan Sultan Indris (UPSI), Malaysia
2. University of Mahidol, Thailand
3. University of Malaysia in Trengganu

Next, I would like to thanks and welcome to 379 speakers from the entire Indonesia and all participants registered in this seminar.

Ladies and gentlemen, recently the number of research and publication on mathematics and science and the education is vulnarable. It is nescessary for us to organise, to share, and to publish the results of the research in this conference. I hope the conference will bear fruitful results and promote networking and future collaborations for all participants from diverse background of expertise, intitutions, and countries to promote science, mathematics, and the education.

Finally, I am delighted to thank the committee members who have been working very hard to ensure the succes of the conference.

Please enjoy the conference and enjoy Yogyakarta, the city of education, tourism, and culture. Thank you very much.

Assalamu'alaikum wa rahmatullahi wa barrakatuh

Dr. Slamet Suyanto, M. Ed.

Forewords from The Dean of Faculty of Mathematics and Natural Sciences, Yogyakarta State University

Assalamu'alaikum warahmatullahi wabarakatuh

May peace and God's blessings be upon us all.

On behalf of the Organizing Committee, first of all allow me to extend my warmest greeting and welcome to the International Conference on Research, Implementation, and Education of Mathematics and Sciences 2014, held in Yogyakarta State University, one of the qualified education universities in Indonesia.

To celebrate the 50th Commemoration of Yogyakarta State University, our faculty, in collaboration with Forum of MIPA LPTK, has the opportunity to conduct International Conference on Research, Implementation, and Education of Mathematics and Sciences 2014. This conference proudly presents five keynote speeches by five fabulous speakers: Prof. Dean Zollman, Prof. David F. Treagust, Prof. Dr. Amy Cutter-Mackenzie, Prof. Tran Vui, and Asst. Prof. Dr. Duangjai Nacapricha, around 380 parallel speakers with 344 orally presented articles.

Distinguished guest, ladies and gentlemen,

The independence of a country is impossible to gain if the education does not become the priority and it is not supported with the development of technology. We all know that the technology development could be achieved if it is supported by the improvement of firm fundamental knowledge. The empowerment of fundamental knowledge could not be separated from research which is related to the development of technology and the learning process in school and universities.

This conference is aimed to pull together researchers, educators, policy makers, and practitioners to share their critical thinking and research outcomes. Therefore, we are able to understand and examine the development of fundamental principle, knowledge, and technology. By perceiving the matters and condition in research and education field of mathematics and sciences, we could take a part in conducting qualified education to reach out the real independence of our nation.

Distinguished guest, ladies, and gentlemen

This conference will be far from success and we could not accomplish what we do without the support from various parties. So let me extend my deepest gratitude and highest appreciation to all committee members. I would also like to thank each of participants for

attending our conference and bringing your expertise to our gathering. Should you find any inconveniences and shortcomings, please accept my sincere apologies.

To conclude, let me wish you fruitful discussion and a very pleasant stay in Yogyakarta.

Wa'alaikumsalam warahmatullahi wabarakatuh

Dr. Hartono

Table of Content

		Page
	Front Cover	i
	Editorial Board and Reviewers	ii
	Preface	iii
	Forewords From The Head of Committee	iv
	Forewords From The Dean of Faculty	vi
	Table of Content	ix
	Plenary Session	
	Using Dynamic Visual Representations To Discover Possible Solutions In Solving Real-Life Open-Ended Problems *Prof. Tran Vui*	I-1
	Parallel Session	
	MATHEMATICS	
01	**On Counting Sequences And Some Research Questions** *I Nengah Suparta*	M-1
02	**Probability Density Function of M/G/1 Queues under (0,k) Control Policies: A Special Case** *Isnandar Slamet, Ritu Gupta, Narasimaha R. Achuthan*	M-11
03	**C[a, b]-Valued Measure And Some Of Its Properties** *Firdaus Ubaidillah , Soeparna Darmawijaya , Ch. Rini Indrati*	M-19
04	**Applied Discriminant Analysis in Market Research** *Hery Tri Sutanto*	M-27
05	**Characteristic Of Group Of Matrix 3x3 Modulo P, P A Prime Number** *Ibnu Hadi, Yudi Mahatma*	M-35
06	**The Properties Of Group Of 3×3 Matrices Over Integers Modulo Prime Number** *Ibnu Hadi, Yudi Mahatma*	M-41
07	**Random Effect Model And Generalized Estimating Equations For Binary Panel Response** *Jaka Nugraha*	M-47

08	**The Properties of Ordered Bilinear Form Semigroup in Term of Fuzzy Quasi-Ideals** *Karyati, Dhoriva Urwatul Wutsqa*	M-55
09	**Systems Of Interval Min-Plus Linear Equations And Its Application On Shortest Path Problem With Interval Travel Times** *M. Andy Rudhito and D. Arif Budi Prasetyo*	M-63
10	**Some Properties Of Primitive ϑ −Henstock Of Integrable Function In Locally Compact Metric Space Of Vector Valued Function** *Manuharawati*	M-71
11	**Learning Gauss-Jordan Elimination Using Ms Excel** *Meifry Manuhutu*	M-79
12	**Linear Matrix Inequality Based Proportional Integral Derivative Control For High Order Plant** *M. Khairudin*	M-83
13	**Bayesian With Full Conditional Posterior Distribution Approach For Solution Of Complex Models** *Pudji Ismartini*	M-91
14	**Optimal Control Analyze And Equilibrium Existence Of Seir Epidemic Model With Bilinear Incidence And Time Delay In State And Control Variables** *Rubono Setiawan*	M-97
15	**Selection Of The Best Univariate Normality Test On The Category Of Moments Using Monte Carlo Simulation** *Sugiyanto and Etik Zukhronah*	M-103
16	**Additive Main Effect and Multiplicative Interaction on Fixed Model of Two Factors Design** *Suwardi Annas and Selfi Dian Purtanti*	M-111
17	**Gram-Schmidt Super Orthogonalization Process For Super Linear Algebra** *Syarif Abdullah, Siti Na'imah*	M-117
18	**Solving A System Of Fourth Order Ordinary Differential Equations By Using Diagonalization Matrix** *Tjang Daniel Chandra*	M-123

19 **A Model For Determining An Optimal Labor Contract Under Profit Sharing System** M-131
Umi Mahmudah, L. Muhamad Safiih

20 **Application of Fourier series In Microtremor Analysis, Case Study On Disaster Risk Management Worth Mining Region In Blitar districts, East Java** M-137
Yogi Wiratomo, D, Parwatiningtyas, D. Marlina, Erlin Windia

21 **Application Of Neuro Fuzzy Model For Forecasting Consumer Price Index In Yogyakarta** M-145
Agus Maman Abadi

22 **Applicating Cvd Algorithm On Edge-Coloring Of Special Graphs** M-151
Nur Insani

23 **Series " H154M " As A Unit Area Of The Region Between The Lines And Curves** M-157
Hisyam Hidayatullah

24 **Symmetry Of Limit Cycles On A Liénard-Type Dynamical System** M-177
Kus Prihantoso Krisnawan

MATHEMATICS EDUCATION

01 **Connectedness Dimension Of Productive Pedagogies In Students' Understandingto Concepts Of Differential Calculus** ME-1
Abadi , Atik Wintarti, and Faradillah Hariyani

02 **Just Questioning in Teaching Mathematics** ME-7
Abdul Haris Rosyidi

03 **Problem Based And Metacognitive Learning To Improve Mathematical Reflective Thinking Skills** ME-13
Abdul Muin and Lia Kurniawati

04 **The Achievement of Mathematical Connection Skills Based on Cognitive Level through Means Ends Analysis (MEA) Strategy of Learning** ME-21
Abdul Muin, Citra Permata, Afidah

05 **Teaching Problem Solving In Mathematics Learning: Reflection From Pisa And TIMSS Results Of The Students Of Indonesia** ME-33
Abdul Rahman, M. Darwis M., S. Asyari, I. Kautsar Qadry

06	**Improving Senior High School Student's Mathematical Communication Abilities And Mathematical Disposition By Using Model-Eliciting Activities** *Adi Asmara*	ME-41
07	**Intoverted Primary School Students' Creativity In Mathematics Problem Solving Based On Gender Differences** *Adri Nofrianto*	ME-47
08	**The Profile Of Primary School Students' Conceptual Understanding Of Equivalent Fractions Based On Kolb's Learning Styles** *Agnita Siska Pramasdyahsari*	ME-55
09	**Development of Interactive Learning Media Based Lectora Inspire in Discrete Method Course** *Alfensi Faruk*	ME-65
10	**Experimentation Stad With Ctl To Material Of Phytagoras Teorema Was Inspected From The Temperament Of Student In Class VIII SMP N 3 Pengasih Kulon Progo The Academic Year 2013/2014** *Ambar Widuri, A.A Sudjadi, Sri Adi Widodo*	ME-73
11	**Improving Mathematical Representation Skill By Using Pace Model** *Andri Suryana*	ME-79
12	**Mathematics Self-Concept And Anxiety With Different Achievement In Calculus Problem Solving** *Angga Hidayat*	ME_85
13	**The Development Of Technology Application Based Mathematics Learning Tools On Real Numbers Operations At The Vocational School Of Technology And Engineering** *Anggita Maharani*	ME-91
14	**Efforts To Improve Students' Mathematical Literacy In Mathematics Learning** *Anik Yuliani*	ME-99
15	**Practicability And Effectivity Of Koncama Model In Geometry Learning** *Asdar dan Jeranah*	ME-105
16	**The Profile Of Junior High School Students' Reasoning In Solving Mathematics Open-Ended Problem According To Reflective-Impulsive Cognitive Styles** *Ayu Faradillah*	ME-113

17 **Mental Computation Strategies By 5th Graders According To Object-Spatial-Verbal Cognitive Style** ME-121
Chusnul Khotimah Galatea

18 **A Comparison Of Students Self-Belief And Mathematics Achievement In The Asian Countries: Finding From The Third International Mathematics And Science Study (TIMSS)** ME-127
Desi Rahmatina

19 **Efforts to Improve Student Learning Ourcomes by Using Cooperative Learning Type of Student Teams Achievement Division (STAD)** ME-135
Dori Lukman Hakim

20 **Keeping Mathematical Assessment Process On Track** ME-143
Edy Bambang Irawan

21 **Enhancing the Students'Ability of Reasoning on Aspects to Formulate the Counter Example through Problem Solving Strategies *Make an Organized List*** ME-149
Kadir and Muhamad Faozan Afandi

22 **Mathematical Communication and Problem Solving Ability of 8th Grade Students after Involving Model Eliciting Activities (MEAs Strategy** ME-157
Endang Wahyuningrum

23 **Developing a Teaching Kit on Pythagorean Theorem with Computer-Assisted Media** ME-165
Erni Ayda

24 **The Implementation Of Curriculum 2013 In The Teaching Of Mathematics And Its Effect Tostudents'mastery Of Esssentialmathematics Concept In Senior High School** ME-173
Euis Eti Rohaeti

25 **Analyzing Mathematical Literacy Of Junior High School Students In West Sumatra** ME-179
Ahmad Fauzan

26 **Efforts To Improve Student Learning Outcomes And Activities With Realistic Mathematics Education (RME)** ME-187
Fina Nurmita

27 **Multidimensional Reliability Estimation In Instrument Of Students' Satisfaction As An Internal Costumer** ME-195
Gaguk Margono

28 **Improving Students' Mathematics Reasoning And Emotional Intelligence Through Meas (Model-Eliciting Activities) Instruction** ME-205
Hamidah

29 **Education Quality Improvement in Indonesia** ME-213
Hamzah Upu

30 **Constructivism Versus Cognitive Load Theory: In Search For An Effective Mathematics Teaching** ME-221
Hamzah Upu,Bustang

31 **Teacher Readiness In Implenting Curriculum 2013 A Case Study On Mathematics Teachers In West Nusa Tenggara Province** ME-229
Hapipi

32 **Internalization Of Multiplication And Division Concepts In A Neo-Piagetian Perspective** ME-237
Helti Lygia Mampouw, Agung Lukito, St. Suwarsono

33 **Analysis Of Students' Mathematical Self-Esteem** ME-249
Heni Pujiastuti

34 **The Effects Of Cooperative Learning Structures And Prior Knowledge Toward The Learning Outcomes Of Understanding And Application Of Physics Concepts For The Students Of Mathematics Education Department** ME-255
Heny Sulistyaningrum and Tanti Nawangsari

35 **The Identification Of Difficulties In Problems Solving Of Mathematics Teachers In Junior High School Of Nusa Tenggara Timur And Maluku Utara** ME-263
*Heri Retnawati, Dhoriva Urwatul Wutsqo, Endang Listyani, Kartiko Rachman Y.P***.**

36 **Improving Students' Metaphorical Thinking Ability Of Mathematic In Senior High School Through Scientific Approach In The 2013 Curriculum** ME-275
Heris Hendriana

37 **Cognitive Profile Of Subject 1 About Philosophy, Principles And Characteristics Of Realistic Mathematics Education Before And After Studying The Realistic Mathematics Education Learning Resource** ME-281
Hongki Julie, St. Suwarsono, and Dwi Juniati

38 **Student's Difficulties In Solving Problem Of Real Analysis** ME-289
Jackson Pasini Mairing

39 **The Comparison Of Mathematical Understanding And Connection Through Cognitive Conflict Of Piaget And Hasweh** ME-299
Jarnawi Afgani Dahlan, Ade Rohayati

40 **Analyzing Students' Strategy In Pattern Generalization** ME-307
Junaidah Wildani

41 **Problem Solving Learning Approach Using Search, Solve, Create And Share (Sscs) Model And The Student's Mathematical Logical Thinking Skills** ME-315
Lia Kurniawati, Bunga Siti Fatimah

42 **Islamic Values In Mathematics Learning** ME-323
Masduki, Rita P Khotimah, Sri Sutarni

43 **Environment Education In Mathematics Classroom: As An Effort To Develop The Critical Thinking Skills And For Environmental Sustainability Concerning** ME-331
Mhmd Habibi

44 **The Influence Of Pmri To Develop Mathematical Communication Skills Fourth Grade Students Of SDN 01 Koto Timur** ME-341
Mira Amelia Amri, Novyta

45 **Learning Model Experimentation Of Think Pair Share (TPS) Of Assessment For Learning (AFI) Based Through Peer Assessment On The Linear Programming Subject** ME-349
Muhammad Noor Kholid

46 **Learning Model Experimentation Of Student Team Achievement Division (STAD) And Think Pair Share (TPS) Of Assessment For Learning (AFI) Based** ME-355
Muhammad Noor Kholid, Yoga Muh. Muklis, Ummi Khasanah

47 **The Profile Of Teacher' Questions On Mathematics Lessons In Ix Class Students With Visual Impairment SMPLB YKAB Surakarta** ME-363
Naning Sutriningsih, Suherman, Siti Khoiriyah

48 **The Profile Of Students' Lateral Thinking In Solving Mathematics Open-Ended Problem In Terms Of Learning Style Differences** ME-369
Nicky Dwi Puspaningtyas

49 **Students' Ability Of Smp To Solve Problems Mathematiclly Creative Thinking** ME-375
Nila Kesumawati

50 **Some Attempts To Improve The Quality Of Teaching-Learning Processes Of Engineering Mathematics** ME-383
Nur Kholis

51 **The Process of Deductive Thinking at 8th Grade Students with High Math Skill in Completing Geometric Proof** ME-391
Pipit Firmanti

52 **Analysis Of Mathematics Teaching Based On The Students Characteristics** ME-399
Rina Oktaviyanthi

53 **The Construction Of The Early-Childhood Teachers' Creative Process Assessment** ME-409
Risky Setiawan

54 **Micro Teaching And Self Efficacy Toward Mathematics Students In Mathematics Program Of FKIP UMB** ME-419
Risnanosanti

55 **The Development Of Realistic Mathematics Education-Based Blog At Linear Algebra Course In UIN Suska Riau** ME-427
Risnawati, Annisa Kurniati, Elviza Regita

56 **The Effect Of *Problem Based Instruction (PBI)* Learning With Using *Aptitude Treatment Interaction (ATI)* Approach Towards Math Problem Solving Ability** ME-433
Risnawati

57 **Implementation Of Cooperative Learning With Talking Chips Technique On Solids Material** ME-439
Rizky Oktaviana E.P.

58 **The Implementation Of Contextual Mini Laboratory Approach To Improve The Mathematical Understanding Of Students In Marginal School Palm Plantation Area Koto Gasib Subdistric, Siak Regency** ME-445
Sehatta Saragih

59 **Tangram Game Activities, Helping The Students Difficulty In Understanding The Concept Of Area Conservation Paper Title** ME-453
Shofan Fiangga

60 **Proving Process And Types Of Proof** ME-461
Silvia Dwi Anggraini

61 **Error Analysis Of Guardians Student In Understanding The Problem Of Divergence** ME-467
Sri Adi Widodo

62 **High Order Thingking Skills And Self Regulated Learning Of Junior High School Student In Bandar Lampung City** ME-473
Sri Hastuti Noer

63 **Cognitive Processes of Elementary School Students in Mathematical Investigation based on Gender Difference** ME-479
Sri Subarinah, I Ketut Budayasa, Agung Lukito

64 **The Development Of A Virtual Mathematics Teaching Aid Based On Cognitive Load Theory** ME-487
Sugiman, R. Rosnawati, Endah Retnowati, Ilham Rizkianto

65 **Conjecturing Via Analogical Reasoning to Explore Critical Thinking** ME-495
Supratman

66 **Developing Teacher Performances to Improving Students Creative Thinking Capabilities in Mathematics** ME-509
Tatag Yuli Eko Siswono

67 **Bilingual in Calculus Class,Introducing Strategy to Conduct Bilingual Classroom in Mathematics** ME-517
Tutuk Narfanti

68 **The Profile Of Students' Metacognition In Learning Through Realistic Mathematics Education** ME-525
Usman Mulbar

69 **The Implementation Of Meas Instruction To Students' Mathematics Problem Solving And Connecting Ability** ME-535
Wahyu Hidayat

70 **Design Of Mathematic Learning Based On Cognitive Style** ME-543
Warli, Mu'jizatin Fadiana

71 **The Use Of Local Context In Designing Learning Activities For Mathematics Teaching In Elementary School** ME-553
Yenita Roza, Syarifah Nur Siregar, Titi Solfitri

72 **The Influence of Blended Learning, Learning Styles Against Understanding Math Concepts** ME-561
Yunia Mulyani Azis & Sussy Susanti

73 **The Development Of Digital Assessment Bloom As Assessment Tools In Junior High School** ME-571
Yurizka Melia Sari

74 **Student Perceptions, Principal Assesment, And Observations Of Teacher Performance** ME-577
Zetriuslita, Gadis Arniyati Athar

75 **An Analysis Of Difficulties On Mathematical Model Interpretation Of Junior High School Students On The Materials Of Two-Variable Linear Equation System** ME-583
Didi Suhaedi, Tia Purniati

76 **The Metacognitive Reflection Ability To Arrange The Strategy of Mathematical Problem Solving** ME-589
Georgina Maria Tinungki

PHYSICS

01 **Analysis and Synthesis of Sound of Gong Ageng of Kagungan Dalem Gongso Kanjeng Kyai Guntur Sari** P-1
Ahmad Fauji, Agus Purwanto

02 **Power Spectrum of Large Gong (Gong Ageng) Kagungan Dalem Gongso Kanjeng Kyai Guntur Sari** P-7
Dhara Nurani, Agus Purwanto, Sumarna

03 **Computation to Obtain the Spread Out Bragg Peak (SOBP) for Proton Radiotherapy on Model of Thyroid Cancer** P-13
Eko Sulistya, Kusminarto, Arief Hermanto

04	**Modeling of Reactive Magnetron Sputtering in Tialn Film Deposition: Analysis of Pump Speed and Target Current Effect** *Esmar Budi*	P-19
05	**Young Lunar Crescent Visibility Prediction on Telescopic-Based Visual Observation** *Judhistira Aria Utama*	P-29
06	**"Joko Tingkir" for Decision Making on Real Time Tsunami Warning System** *Madlazim, Supriyono, Masturyono, Thomas Hardy, Karyono*	P-33
07	**The Study of Harmony on Triad Key C in C Major** *Mega Rusitha, Agus Purwanto*	P-39
08	**The Effect of Reducing Na_2O and Increasing PbO on Optical and Physical Properties of TZPBN:Er Glasses** *M. N. R. Jauhariyah, Ahmad Marzuki, Cari*	P-45
09	**QCL Based Integrated Cavity Output Spectroscopy for Gas Detection** *R. Widiatmono, J. Mandon, F.J.M. Harren, Kusminarto, M.A.J. Wasono, Mitrayana*	P-55
10	**The Development of Titania Solar Cells by Insertion of Conductive Material as an Alternative Third Generation Solar Cells** *Rita Prasetyowati*	P-65
11	**The Patterns of The Sound Intensity Distribution of Midrange Loudspeaker** *Septiana Nur Laely, Agus Purwanto*	P-69
12	**Analysis of Waste Sand at Diamonds Mining Cempaka Banjarbaru** *Mustika Wati, Sri Hartini*	P-75
13	**Simulation on Power Spectrum Density (PSD) of an Optically Trapped Particle** *Sugeng Riyanto, Shahrul Kadri Ayop, Wan Nor Suhaila Wan Aziz*	P-79
14	**Re-evaluation of Hilaal Visibility Criteria in Indonesia by Using Indonesia and International Observational Data** *T. B. Ramadhan, T. Djamaluddin, J. A. Utama*	P-87
15	**The Development of Universal Mass Balance** *Wan Nor Suhaila Wan Aziz , Shahrul Kadri Ayop, Mohamad Azrul Amat, Mohd Helmy Hashim, Rosly Jaafar*	P-93

16 **Testing Microcrystalline Celullose using Spectrometer and Polarized Light Microscope** P-99
Harsojo, Dedi Mardiansyah, Harini Sosiati

17 **An Example of System Which Can Be Used to Explicitly Show The Symmetry Between the Electric and Magnetic Fields** P-107
Arief Hermanto

18 **The Effect of Tellurium Atomic Fraction On The Crystal Structure And Chemical Composition of Pb (Se1-X, Tex) Semiconductor Materials Prepared Using Bridgman Technique** P-113
Ariswan and Denny Darmawan

PHYSICS EDUCATION

01 **The effectiveness Using of Contextual Teaching Material Integrating Mathematics, Natural Science, Disasters and Character Base on ICT in Physics Learning High School Grade XI** PE-1
Akmam, Harman A, Asrizal, Dea. S, Widya. F

02 **Improving The Result of Physics Study of The students on Particle Dynamics Topic by Using Contextual Teaching and Learning (Classroom Action Research at class X Science 2 at Public High School (SMAN 68) Jakarta-Indonesia)** PE-13
Anida Nurafifah, Slamet Siswoyo, Vina Serevina

03 **Efforts to Improve the Students Learning Outcomes at Particle Dynamic Topic by Using Inquiry Method, Constructivism and Learning Community in class X 5 SMAN 68 Jakarta** PE-23
Annisa Nor Fitria, Hasan, Vina Serevina

04 **Development of Blended Learning Model for Improving Students Competence in the Engineering Physics Learning** PE-35
Usmeldi

05 **Development of Teaching Aid of Electrometer in Physics Learning** PE-45
Dr. Esmar Budi, M.Si, Hadi Nasbey, S.Pd, M.Si, Dio Sudiarto

06 **Development Of An Android Application In The Form Of A Simulation Lab To Explain Properties Of An Ideal Gas** PE-49
A.Nugraha

07 **Treating Fourier series as vector: a concept simplification for teaching Fourier series** PE-59
Johannes V.D. Wirjawan

08 **Mapping of Profesional, Pedagogical, Social, and Personal Competence of Senior High School Physics Teachers in Yogyakarta Special Region** PE-65
Jumadi, Zuhdan Kun Prasetyo, Insih Wilujeng

09 **The Development of Physics Based on Problem Based Learning for Gifted-Talented Students at Islamic Senior High School of Amanatul Ummah Grade XI** PE-77
Mukhayyarotin Niswati Rodliyatul Jauhariyah, Sarwanto, Suparmi

10 **Reasoning-Based Diagnostic Test to Identify Learning Difficulties and Misconceptions of Work and Energy Among Senior High School Students** PE-89
Mundilarto, Zuhdan Kun Prasetya, Suyoso, Wiwi Diah Ratnasari

11 **Improving The Result of Physics Study of The Students on Circular Motion Topic by Using Project Based Learning (Classroom Action Research at class X Science 3 at Public High School (SMAN 68) Jakarta-Indonesia)** PE-97
Umi Nurhasanah, Herwin Sinaga, Vina Serevina

12 **Student's Self-Confidence to Understanding The Physics Concepts Through Computer Simulation Animation** PE-107
Wahyu Hari Kristiyanto, Prabowo, Soeparman Kardi

13 **The Comparation Study of Laboratory Experiment and Computer Simulation Methods in Increasing Students' Cognitive Achievement and Science Process Skills on The Topic of Linear Motion** PE-113
Yosaphat Sumardi, Dyah Uswatun Khasanah, Titin Marseta Dyah Utami, Novia Istikhomah

14 **The Development of Physics Essay Test for Higher Order Thinking Skills in Junior High School** PE-121
Edi Istiyono

15 **Performance of Diploma of Science Students at Upsi in Force Concept Inventory** PE-129
Nur Solehah Rahim and Shahrul Kadri Ayop

16 **The Estimation of Inquiry Performance Test Items of High School Physics Subject with Quest Program** PE-137
Supahar

17 **Analyzing Physics Items of UN, TIMSS, and PISA Based on Higher-Order Thingking and Scientific Literacy** PE-147
Wasis

18	**Improving The Student Learning Outcomes of Physics Subject at Circular Motion Topic by Using discovery Method (Classroom Action Research at class ten (X-1) at Public High School (SMAN 68) Jakarta-Indonesia)** *Muhammad Elizar Utomo, Heny Kuspianto, Vina Serevina*	PE-155
19	**The Measurement of Lecturers' Teaching Quality and Academic Atmosphere in International Class Program of FMIPA UNM Makassar** *Kaharuddin Arafah*	PE-167
20	**Increasing Student's Attention In Physics Learning With Computer Interactive Enhancing Attention of Physics Student Learning of Interactive Computer Help with Instruction-Assisted** *Festiyed*	PE-175
21	**Development of Evaluation Model of Physics Experiment Exam for Secondary Level** *Setiya Utari, Harun Imansyah, Winny Liliawati, Arif Hidayat*	PE-182
	BIOLOGY	
01	**Scale Morphology of Cuning Fish (*Caesio Cuning* Bloch, 1971) (Caesionidae) Using Dekstop Scanning Electron Microscope** *Abdul Razak*	B-1
02	**Growth of Local Rice Genotypes Planted Center Paddy Production in West Sumatera** *Azwir Anhar*	B-11
03	**Optimization of PCR Conditions for Amplify Microsatellite Loci in Cotton (*Gossypium Hirsutum*) DNA** *Dede Nuraida*	B-21
04	**Factors Associated with Higher Uptake for HIV Testing among Indirect Female Sex Workers (FSWs) in Yogyakarta Indonesia** *Dhesi Ari Astuti*	B-27
05	**Recent Development Of Carotenoids Encapsulation Technology** *Dian Marlina*	B-33
06	**Antimicrobial Activity of Extracelullar Protein from Six Isolates of Thermophilic Bacteria** *Evy Yulianti*	B-41
07	**The Impact of Circumcision Towards Women** *Farida Kartini*	B-51

08	**Pseudomonad Fluorescent Preservation Using Tapioca and Rice Flour Carrier and The Addition of Glycerol Stabilizer** *Linda Advinda*	B-61
09	**Inhibitory Power Test Medicinal Plants Against Methicillin Resistant Bacterial Growth Strains of Staphylococcus Aureus (MRSA)** *Mades Fifendy*	B-67
10	**Microalgae Biomass Production and Nitrate Removal from Landfill Leachate** *Norjan Yusof*	B-73
11	**The Effect of Skim Milk Addition in Cep-2 Diluent on Motility and Viability of Limousin Bull Sperm during Storage at Refrigerator** *Nur Ducha*	B-83
12	**Cage Temperature in Relation to The Width of Beak Opening of Gelatik Jawa (*Padda oryzivora*)** *Nur Kuswanti*	B-89
13	**Feasible Options to Reduce Greenhouse Gases Emission From Agriculture and Its Effect to Microbial Communities in Indonesia** *Oslan Jumadi*	B-95
14	**Morphogenetic Effects of Several Plant Growth Regulators (PGR) on In Vitro Development of Binahong (*Anredera cordifolia* L.) Leaf** *Paramita Cahyaningrum Kuswandi*	B-103
15	**Composition and Structure of Mangrove Associates Vegetation in Kwandang Coastal Area North Gorontalo Region and Mananggu Coastal Area Boalemo Region** *Abubakar Sidik Katili*	B-109
16	**Inventory The Waterbird Species which Accumulate Mercury from Mining Waste in Coastal Area North Gorontalo Regency, Indonesia** *Ramli Utina*	B-117
17	**Regeneration in Vertebrates : A Research Model to Study Angiogenesis** *Rizka Apriani Putri*	B-127
18	**Cellular Distributions of Cloride and Hidrogen Peroxide In Mesophyll and Bundle Sheath Cells of Maize Exposed to Salinity Stress**	B-133

Rusdi Hasan

19 **Turgo Society's Environment Wisdom in Managing Natural Resources and Environment** B-143
Suhartini

20 **Menstrual Cycle and History of Infectious Diseases Related to Anemia in Adolescent Women** B-151
Sulistyaningsih

21 **Swiftlet Bird (*Aerodramus fuciphagus*) Affinity Analysis in Java and Kalimantan Based on Morphometry** B-159
Sunu Kuntjoro

22 **Phytochemical Analysis of Manggong Bamboo Leaf Extract** B-165
Supriyatin

23 **Cadmium and Lead Content in Aquatic Ecosystem, Brackiswater Ponds and Fish in Areas Affected LAPINDO Mud** B-169
Tarzan Purnomo

24 **Epyphitic Cyanobacteria on Pneumatophore *Avicennia marina* in Mangrove Ecosystem of Cagar Alam Pulau Dua (CAPD) Serang, Banten** B-177
Tika Khusnul Fatimahsari

25 **Contens of Phenolic Compounds of *Pluchea Indica* Leaves Extract from Some Altitude Habitat** B-183
Yuliani

26 **Follicle Stimulating Hormone Receptor Ser680asn Polymorphism in Women with Polycystic Ovary** B-189
Yuni Ahda

27 **The Role of Mychorhizae, Rhizobium, and Phosphate Soluble Bacteria to Increase Plant Tolerance Grown on High Saline Soil** B-195
Yuni Sri Rahayu

BIOLOGY EDUCATION

01 **The Development of Inquiry Based Vertebrate Zoology Practicum Guidance to Increase Cognitive and Skill Process of Biology Students** BE-1
Andi Asmawati Azis

02 **The Relationship Between Teachers' Attitude of Sex Education among Adolescents and the Implementation of Sex Education at School** BE-9
Anjarwati

03 **The Comparison of Water Management Knowledge and Water Conservation Attitude on Farmers at Gunung Kidul Regency** BE-19
Diana Vivanti

04 **Development of Project-Based Worksheets of Pharmacognosy to Train Critical and Creative Thinking in Biology Students** BE-27
Evie Ratnasari

05 **Improving Comunication Ability and Learning Achievment in Biology Learning Strategy Using Jigsaw** BE-35
Fitri Arsih

06 **Implication Of Problem Based Instruction (PBI) Toward Student's Ability in Solving of Environmental Pollution Problems** BE-43
Iis Sugiati

07 **Efforts to Promote Critical Thinking through Cooperative Learning Type Think Talk Write Assignment Based on Basic Genetics** BE-51
Imas Cintamulya

08 **Related Knowledge Of Diarrhea In Infants With ASI Exclusive Breastfeeding Behavior In West Java** BE-57
Mia Nurkanti

09 **Correlation Analysis Between Discriminancy Power and Validity of Item Tests** BE-63
Muhyiatul Fadilah

10 **Development and Validation of Physical Classroom Learning Environment Instrument (PCLI) for Secondary School in Malaysia** BE-69
Nurul Jannah Binti Amirul

11	**Increasing Student's Activities and Learning Achievement in General Biology Course Using Reading, Questioning, and Answering Method** *Rahmawati D*	BE-77
12	**Learning Activators to Energize Self-Study Using Computer-Assisted Module (CAM)** *Shakinaz Desa*	BE-83
13	**Web Based Learning Media Development in Cardiovaskular System Human Anatomy and Physiology Subject** *Sri Rahayu*	BE-91
14	**Factors That Influence The Effectiveness of Process and Result Research in Students' Accomplishment** *Suciati*	BE-97
15	**Inculcating Awareness on Biodiversity Using Project-Based Learning** *Syakirah Samsudin*	BE-103
16	**Environmental Care Attitude Formation in Biology Student Programming Environmental Science Course Method Through Project Task Method** *Winarsih*	BE-111
17	**The Implication of Islamic Character Education and Minangkabau Culture to Biological Learning Achivement** *Yosi Laila Rahmi*	BE-119
18	**Developing Learning Outcome Based on The Indonesian Qualification Framework Level Six for Biology Education** *Zuhdan Kun Prasetyo*	BE-127
19	**Analysis of Student's Misconceptions on Basic Science Concept Through CRI (Certainly of Response Index), Clinical Interview and Concepts Map** *Zulfiani*	BE-135
20	**Increasing ISTE Program Student's Activities Using Video on Writing and Retelling** *Zulyusri*	BE-147
21	**The Development of Teaching Material Internalization Models on Topic Human Reproductive System Tocultivate Moral Sensitivity And Discipline** *Raharjo*	BE-155

CHEMISTRY

01 **The Effects Of Micro- And Nanohydroxyapatite Application In Metal Contaminated Soil On Metal Acccumulation In Ipomoea Aquatica And Soil Metal Bioavailability** C-1
Azlan Kamari, Norjan Yusof, Che Fauziah Ishak, Esther Phillip, and Galuh Yuliani

02 **Chromium Extraction from Soil by Using Green Mustard (*Brassica juncea)*** C-9
Tri Santoso, Baharuddin Hamzah, Irwan Said, Ririen Hardani

03 **Biosorption of Technical Direct Dyes by Activated Sludge** C-17
Dewi Yuanita Lestari and Endang Widjajanti LFX

04 **Effect Activation of Chemical and Physical to Structure and Activated Carbon Quality from Charcoal Obtained Bypyrolysis of Coconut Shell** C-23
Djefry Tani, Bambang Setiaji, Wega Trisunaryanti, Akhmad Syoufian

05 **Effects of Calcination Temperatures on Synthesis of $LiMn_2O_4$ by Polymer Matrix-Based Alkaline Deposition Method** C-35
Dyah Purwaningsih, Hari Sutrisno, Dewi Yuanita Lestari

06 **Silver Nanoparticle Impregnated on The Composite of Bacterial Cellulose-Chitosan-Glycerol as Antibacterial Material** C-43
Eli Rohaeti, Endang Widjajanti LFX, and Anna Rakhmawati

07 **Determination of Glycemic Score of Processed Food from Whole Wheat (*Triticum aestivum* L.) Flour Dewata's Variety in Terms of Amylose Content and Starch Digestibility** C-55
Febrine Pentadini, Silvia Andini, Sri Hartini, Anik Tri Haryani

08 **Characterization of Quinoline and Quinoline Conjugated Metal as The Base Material of Photodetector** C-63
I Gusti Made Sanjaya, Dian Novita and Aldo Swaztyznt Saputra

09 **Study On Population Of From D. Melanogaster Katul Media Fermented Sacharomyces Cerevisae As Swiflet Woof** C-71
Ignatius R. S. Santoso

10 **Preparation and Mechanistic Study of ZnO/Zeolite as Catalyst in 1-Pentanol Dehydration** C-79
Is Fatimah

11	**Effect of Pyrolisis Temperature and Distillation on Character of Coconut Shell Liquid Smoke** *Johny Zeth Lombok, Bambang Setiaji, Wega Trisunaryanti, Karna Wijaya*	C-87
12	**Characterization Chemical Compound Based Pyrolysis Process from Cacao Wastes** *Mohammad Wijaya.M*	C-97
13	**Preparation and Characterization of Poly(Є-Caprolactone) Microparticle Blends Containing Propranolol HCl and Carbamazepine** *Muhaimin, Burkhard Dickenhorst, Roland Bodmeier*	C-103
14	**Production and Characterization of Anti Fim-C *Salmonella typhi* Native Protein Antibody in Ddy Mice** *Muktiningsih Nurjayadi, Umar Hasan, Dea Apriyani, Fera Kurnia Dewi, Irma Ratna Kartika, Fernita Puspasari, Dessy Natalia*	C-111
15	**Synthesis of Star Poly(4-Vinylpyridine) Architecture by Nitroxide Mediated Polymerisation** *Nurulsaidah Abdul Rahim, Fabrice Audouin, Johannes G Vos, Andrea Heise*	C-119
16	**Antifungal Potential Test of Glycoside Compound from Root Woof of *Pterospermum subpeltatum* C. B. ROB** *Pince Salempa, Alfian Noor, Nunuk Hariani, Sudding, Muharram*	C-127
17	**Test Method Verification of Fe and SiO_2 in Industrial Water by Uv-Vis Spectrophotometry at Pt Krakatau Steel** *Reni Banowati Istiningrum, Intan Permatasari, Idrus Bambang Iryanto*	C-133
18	**Chalcones: The Promising Compounds to Provide New Ways for Cancer Treatment** *Retno Arianingrum*	C-141
19	**Electrocoagulation of Detergent *Wastewater Using Aluminium Wire Netting Electrode (Awne)*** *Riyanto and Afifah Hidayatillah*	C-151
20	**Characterization K_3PO_4/NaZSM-5 Using Xrd and Ftir as a Catalyst to Produce Biodiesel** *Samik, Ratna Ediati, and Didik Prasetyoko*	C-159

21 **Adsorption Rate Constant and Capacities of Lead(Ii) Removal from Synthetic Wastewater Using Chitosan Silica** C-165
Sari Edi Cahyaningrum and Dina kartika

22 **Intervention Effect of Liquid Smoke of Pyrolysis Result of Coconut Shell on Profile of pH Fillet of *Lates Calcarifer*** C-171
Sofia Satriani Krisen, Bambang Setiaji, Wega Trisunaryanti, Harno Dwi Pranowo

23 **Phytochemical of *Kaempferia* Plant and Bioprospecting for Cancer Treatment** C-179
Sri Atun

24 **Study of Acid Catalysis for Condensationof 4-Hydroxybenzaldehyde With Acetone** C-187
Sri Handayani

C-195

25 **Isolation and Identification Secondary Metabolites Compound Ethyl Acetate : N-Hexane (4 : 6) Fraction of Gulma Siam Leaves (*Chromolaena odorata* L.)**
Sudding

C-203

26 **Review of Applications Nanoparticles of TiO_2 and ZnO in Sunscreen**
Sulistyani

C-213

27 **A QM/MM Simulation Method Applied to The Solution of Zr^{4+} in Liquid Ammonia**
Suwardi, Harno D. Pranowo dan Ria Armunanto

C-221

28 **Comparative Study of Methods in The Synthesis of Magnetite (Fe_3O_4)**
Suyanta, Eko Sri Kunarti, Muhamad Muzakir, Citra Pertiwi and Dian Pertiwi

C-229

29 **Chemical Constituents of Indonesian Silver Fern (*Pityrogramma calomelanos*) and Their Citotoxicity**
Suyatno, Nurul Hidajati, Khoriyah Umami, and Ika Purnama Sari

C-237

30 **Chitosan and *N*-ALKYL Chitosan as A Heterogeneous Base Catalyst in The Transesterification Reaction of Used Cooking Oil**
Tatang Shabur Julianto and Restu Ayu Mumpuni

C-243

31 **Study on Growth of Carbon Crystal from Charchoal Obtained by Pyrolysis of Coconut Shell**
Meytij Jeanne Rampe, Bambang Setiaji, Wega Trisunaryanti, Triyono

32 **Phenolic Compounds from Chloroform Extract of *Xylocarpus Moluccensis* Stem Bark (Meliaceae)** C-251
Tukiran, Nurul Hidayati, Nurul Aini, and Yunita Dwi Setyorahayu

33 **Preparation of Chitin from Shrimp Shells by Papain Latex (*Carica Papaya*)** C-259
Yuli Rohyami, Reni Banowati Istiningrum, Ida Sulistyaningrum

34 **Characterization of Cu(Ii) Complexes of 4-Methylbenzenesulfonylhydrazone and The Potential as Reagent for Phenolic Compound Detection** C-267
Yusnita Juahir, Norlaili Abu Bakar, Wan Rusmawati Wan Mahamod, Saripah Salbiah Syed Abdul Azziz, Rozita Yahaya, Wong Chee Fah

CHEMISTRY EDUCATION

01 **A Brief Review of The Complexities of Teaching and Learning Chemical Equilibrium With Specific Reference to Malaysia** CE-1
A.L. Chandrasegaran, David F. Treagust, Mauro Mocerino, Mihye Won & Mageswary Karpudewan

02 **The 1st Year Chemistry Undergraduate Students' Understanding in Naming Simple Compounds** CE-9
Habiddin

03 **The Use of Hybrid Multimodal Learning on Chemistry at Senior High School to Improve Students' Motivation** CE-19
Hesty Parbuntari and Jaslin Ikhsan

04 **The Use of Ict-Based Media in Web-Based Collaborative Assistance of Hybrid Learning on Chemical Kinetic to Improve Students' Academic Performance** CE-27
Jaslin Ikhsan

05 **Development of Online Learning using Moodle Version 2.5.3 (Case Study at Secondary Schools, Jakarta)** CE-39
Maria Paristiowati and Amanda Franciska

06 **Improving The Learning Process of Polifunctional Compound Topic by Using Jigsaw Cooperative Learning with Multi Learning Resources** CE-47
Mitarlis, Sri Hidayati Syarief, Nurul Hidayati, Suyatno and Tukiran

07 **Implementation of Jigsaw Model with Lesson-Study-Based on Strategy And Method of Chemistry Instruction Subject (Smpk)** CE-55
Muhammad Danial

08 **The Influence of Constructivism Approach in Direct Learning Towards Students' Metacognitive Awareness and Learning Outcomes in The Topic of Solubility and Solubility Product** CE-63
Muharram, St. Hayatun Nur Abu, and Jusniar

09 **The Use of Web-Based Assistance in Multimodal Chemistry Learning at Senior High School to Improve Students' Motivation** CE-71
Nuke Ajeng Prabawati and Jaslin Ikhsan

10 **The Development of Inorganic Chemistry Learning Model Based on Portfolio Assessment** CE-79
Ramlawati and Melati Masri

11 **The Development of Android Mobile Game as Senior High School Learning Media on Rate Reaction and Chemical Equilibrium** CE-85
Resti Yektyastuti, Jaslin Ikhsan2, Rr. Lis Permana Sari

12 **Implementation of Guided-Inquiry to Promote Students' Metacognitive Self Regulation in Xi Grade** CE-91
Rusly Hidayah, Fitria Dwi Lestari

13 **Improving Students' Critical Thinking and Character Skill Through Chemsistry Lecture** CE-97
Sri Poedjiastoeti

14 **Misconception Prevention of Senior High School Students on Chemistry Concepts Using Several Inquiry-Based Learning Models** CE-105
Suyono

15 **The Development of Android-Based Mobile Learning Media as Chemistry Learning for Senior High School on Acid Base, Buffer Solution, and Salt Hydrolysis** CE-113
Yogo Dwi Prasetyo, Jaslin Ikhsan, and Rr. Lis Permana Sari

16 **Engaging Students in Social Emotional Learning: The Role of Dilemma Stories in Chemistry Learning** CE-123
Yuli Rahmawati, Nurbaity, and Marheni

SCIENCE EDUCATION

01 **Influence of Frequency Natural Grasshoppers Sound to Leaf Chlorophyll Content Teak** (*Tectona grandis*) **and Peanut** (*Arachis hypogaea*) **as Natural Science Learning Resources** S-1
Asri Widowati, Juli Astono, Agus Purwanto

02 **The Efforts To Improve Teacher Ability Of State Elementary School Jetis 1 Of Yogyakarta In Developing A Scientific Writing Through A *Collaborative* Approach** S-9
Astuti Wijayanti, Aris Munandar

03 **The Development Of "Cerdas" Learning Model Based On Gardner's Theory Of Multiple Intelligences In Natural Science** S-23
Atiek Winarti

04 **Integrated Science Smp/Mts Based On The Local Potential In Yogyakarta Special District** S-33
Insih Wilujeng

05 **An Effective Curriculum Units For Running Inquiry Based Science Learning Activities In Schools: A Success Story** S-41
Kandi

06 **The Identification Of Multiple Intelligences Of 8th Grade Students Of Junior High School** S-51
Kartika Gita Septiana[1], Jaslin Ikhsan[2]

07 **Learning Science Oriented Pedagogy For Sustainability To Build The Concern For The Environment** S-59
Susilowati

08 **The Impact Of Structured Designed Multimedia And Commercial Learning Media Towards The Learning Outcomes Of Student Who Have Low Motor Ability In Learning Breastroke Swimminng Technique** S-65
Syahrastani

09 **Effect Of Globalization On Learning Science In The District Smpn Of Bantul** S-71
Yuni Wibowo , Asri Widowati , Purwanthy Widhi H.

10 **Contributions Of The Certification Aspects To The Performances Of Natural Science Teachers In Junior High Schools In The Regency Of Hulu Sungai Selatan, The Province Of Kalimantan Selatan** S-85
Syubhan Annur

11 **Project Approach In Science: An Exploratory Case Study**
Mohd Halim Marzuki and Sopia Md Yassin S-89

12 **Assessment Of Tofu Carbon Footprint In Banyumas, Indonesia - Towards 'Greener' Tofu** S-97
Sidharta Sahirman, Ardiansyah

M -

STUDENTPERCEPTIONS, PRINCIPALASSESMENT, ANDOBSERVATIONSOFTEACHERPERFORMANCE

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Abstract

It's important to know theteacher'sperformance, because the teacher is implementing cutting edge of education.This research aims to describe the performance of mathematics teacher at junior high school in Pekanbaru. Total population was approximately 500 teachers and samples taken was 10 % of the population is 50 people. The results of the research show the followings performance of the teacher, (1) from observation, learning process was categorirized good (76,35%),(2) From principal assesment was categorized good (84,82%), (3) From perception of student, was categorized good (80,48%). The conclusions show that the performance of teacher mathematics at junior high school in Pekanbaru was categorized good (80,55%).

Kata kunci : ***Performance, Teacher Mathematics, Pekanbaru.***

INTRODUCTION

Education occupies a central position in construction, where the quality of education will be orientated in human resource development. Improving the quality of education is determined by the readiness of human resource in process. One of thehuman resourcesin educationisthe teacher.

Teacher is a dominant and very crucial factor in education. This is due to the teacher often used as a role model even figure of identification for students. Besides students and the facilities of school, the teacher is also an instrument who influenced in reaching the purpose of education.

The success ofeducationis determinedreadiness ofteachers in preparinglearnersthroughteaching and learning activities. However,the strategispositionof teacherstoimprove the quality ofeducationis strongly influencedbythe professionalabilityof teachersandthe quality ofits performance. So far,teachers are requiredto haveperformancethat is able todeliverandrealize thehopesanddesiresof allparties.

Teacher's ability in teaching is very crusial because it's very influence in education achievement. Generally, a good quality of education determine the teacher's ability in teaching.

Teachersin principlehave ahighenoughpotentialtobe creativein order toimprove its performance. But thepotential ofteacherstobe creativein an effortto improve its performanceis notalwaysdevelop naturallyandsmoothly. This is dueto the influenceofvarious factorsthatappear inbeyondpersonalteacher.

On theother handthe performanceof teacherswasan issuewhendiscussingthe problem of improvingthe quality of education. Controversybetweenthe ideal conditionsthatmust be livedup to expectationsteachersLawon National Education SystemNo. 20 of 2003withthe realitythathappensis somethingthat needs to beexaminedin depth. A teachermusthave agood performancein carrying outits duties, itmust bereflected initscompetence that areprofessionalcompetence, pedagogical, andsocialpersonality. Thuseducationin Indonesiais expected tohave agood quality(PP. 192005)

Performancecan be seeninaspects ofqualityactivitiesanddutiesin carrying outthe task. The main taskof a teacheristo teach, then theteacher's performance can beseen in theactivities ofthe teacherwhile teachinginthe learning process(Martinis Yamin, 2010).

Furthermore, according to Nana Sudjana (2004) teacher performance seen from the ability or competence in the learning task. Skills related to tasks teachers teaching ability can classified into four they are 1) Planning for teaching and learning, 2) Implement and manage the learning process, 3) Assess the progress of the learning process, and 4) Mastering the lesson material . In line with Nana Sudjana, P2TK Directorate General of Higher Education in Mulyasa (2008) describes the tasks teachers teaching into three activities that contain the ability to teach , that are 1) Planning learning, 2) Implement educational learning, 3) Assess the learning process and outcomes.

Based on some opinions above it can be concluded, teacher performance is the result achieved by the teacher in carrying out the tasks assigned to him based on his ability as a teacher in three activities that contain the ability to teach, they are 1) Planning learning, 2) Implement educational learning, 3) Assess the learning process and outcomes. Teacher performance can be said to be related to the competence of teachers : a) professional competence, b) pedagogical, c) social competence, and d) personal competence (UU No 14 years 2005). Professionalism in carrying out the task, the teacher is obliged to plan learning, implementing a quality learning process, as well as assess and evaluate learning outcomes.

It's important to know the teacher's performance, for the purpose of research is to describe or illustrate the performance of the teacher in this case especially those math teachers of public and private junior high schools in Pekanbaru . The results of this study are expected to be useful to teachers, in order to improve its performance, and also provide input related teacher performance. Besides other benefits also give an idea of how big a percentage of the performance of teachers so that they can be shown to relevant institutions in particular to the general education department and local and central government to follow up on the results of this study in order to generate the resources educators better in the future.

DISCUSSION

This study uses quantitative and qualitative descriptive statistics which will describe the actual state of the phenomenon of teacher performance. While statistical methods are quantitative and qualitative calculate the percentage and the category of the object under study (Suharsimi Arikunto, 2002).

The population in this study were Mathematics teachers of Junior High School in Pekanbaru. Data of population obtained from the data of information about Junior High teachers in Department of Education in Pekanbaru especially Mathematics teacher. From the data obtained that the number of mathematics teachers in Pekanbaru are 450 people (maximum of yet unidentified, population predictions over the data obtained). In consideration of the large number of samples, available time, energy and funds the samples in this study were taken 10 % of the total population of the 50 teachers (Suharsimi Arikunto, 2002).

As stated above, that the main purpose of this study is to reveal about teacher performance. To capture more accurate data, the assessment is taken from the three aspects of teacher observations, perceptions of principals, and student perceptions. Therefore the instrument in this study that there are three pieces of observation, questionnaires for principals and questionnaires for students. The instrument uses a Likert scale assessment.

Statistical analysis that used isdescriptivestatistical analysiswiththe percentage(Anas Sudijono, 2011). Toanalyzethe datathat has beenobtained bythe authorsto changethe datain the form ofa percentagetoclassifythe resultswith the following criteria:

Table1
IntervalValues andCriteriain Research

No	Interval Value	Criteria
1	85% < N ≤ 100%	Very Good
2	68% < N ≤ 85%	Good
3	52% < N ≤ 68%	Enough
4	36% < N ≤ 52%	Bad
5	20% < N ≤ 35%	Very Bad

(Riduwan dan Sunarto, 2009)

1. Performance datafrom theTeacherObservation ResultsinLearning Process

Data onthe performanceof teachersofthe observationsdescribedbasedlesson planning, implementationandassessmentof learningof learningcan be seenin Table2 below:

Table2
Performance datafrom theTeacherObservation ResultsinLearning Process

No	Indicator Observed	Total Scorr	Max Scorr	%	Criteria
1.	Lesson Planning	2684	3500	76,69	Good
2.	Learning Implementation	4590	6000	76,50	Good
3	Learning Evaluation	1506	2000	75,30	Good
TotalScoreandthe average percentage		8780	11500	76,35	Good

Generally, teacher performance in direct observation has a good category. But need moreattentiononlearningassessment in indicatorbecause it getsthe lowest percentage.

From the observationsinthe learningprocessshowthe resultsthatneed to beimprovedinsometeachers' performance, namely: (1) the delivery ofcompetencyto be achievedvery rarelydonebyteachersineachlesson, (2) use ofsources/media, (3) the abilityof teachersin linkingmaterialwithotherknowledgeappropriateto thedevelopment ofscience and technology, andreal life, activitiesthat involvestudentsin the creation andutilization oflearning resources/learning mediaand,(4) apply theportfolio assessment.

Unfamiliarity about the things that are wanted make a learning destination that does not motivate the students, for the delivery of competence is needed. Joyce and Weil (2004) say that the learning experience is not only about the content that they can learn, but also improve their ability to complete the task and make learning to program themselves. For the delivery of competency will increase students' awareness achievement to be achieved and this will increase the awareness of students to learn. Because the most important thing is that the awareness will help to survival (Hergenhann and Olson, 2008).

The application portfolio assessment is rarely performed by teachers due to teacher trouble because the large number of students. Schools that do the portfolio assessment have very small amounts. The portfolio is a collection of documents and works of students in some parts which are organized to determine the interests, developmental achievement, and creativity of learners (Popham, 1999). Though this kind of assessment is suitable to determine the development of performance by assessing learners with the works or doing

tasks. The development of the ability of learners can be seen in the results of portfolio assessment.

2. Data of the Teacher Performance from Principal Assessment

The data of teacher performance from principal assessment by using aspects of pedagogic, personal, social, and professional, it can be seen in Table 3 below :

Table 3
Data of Teacher Performance from the Results of Principal Assessment

No	Aspects Assessed	Score	Maximum Score	%	Criteria
1	Pedagogic Competence	1857	2250	82,53	Good
2	Professional Competence	1206	1500	80,40	Good
3	Personal Competence	1313	1500	87,53	Very Good
4	Social Competence	1137	1250	90,96	Very Good
Total and Average Percentage		5513	6500	84,82	Good

From Table 3 above it can be seen that the performance appraisal of teachers from the school principal to be in good category, by the highest competence exist on indicators of social competence. Two indicators supporting the pedagogical competence and professional competence have a good category, while the personal competence and social competence has a very good category. This suggests that for social competence and personality of the teacher's performance has been as expected, while in the professional competence and pedagogical need to be increased again.

However there are a few items of teacher performance that need attention , namely: (1) mastery of the issues advanced in the field being taught, (2) involvement in scientific activities of professional organizations, (3) ability to demonstrate a link between areas of expertise that are taught in the context of life, (4) mastery of technology and instructional media .

3. Data of Teacher Performance from Students' Perceptions

Data of Teacher Performance from Students' Perceptions can be seen in table 8 below:

Table 4
Data of Teacher Performance from Students' Perceptions

No	Indicator	Score	Maximum Score	%	Criteria
1	Discipline application in task implementation	6063	8250	73,49	Good
2	AbilityManagingLearning Activities	6514	7500	86,85	Very Good
3	Ability in Mastering the Materials	4947	6000	82,45	Good
4	Ability in Develop Creativity	1188	1500	79,20	Good
Total Score and Average Percentage		18712	23250	80,48	Good

From Table4above, it can be seenthatthe teacher performance from students' perceptionscan already besaid to be good. The highest category has the ability to managethe learning activities. However,therestill needsimprovement, especially onindicatorsof disciplinein carrying outthis task becauseobtainingthe lowest percentageie73.49%.

However,there areitemsthat need tobe improvedteacherperformance, namely: (1) utilization ofthe mediain the learning process(2) the application ofdisciplinein carrying outthe taskand(3) the

ability oftheitemTeachersgive awards(4) The use ofa methodordifferent learning strategiesin the learning process. (5) Linkingthe materialwithotherknowledgeof science and technologydevelopment.

4. Data of Teacher Performance from Direct Observation in Each Subdistrict in Pekanbaru

To see the teacher performance in each subdistrict in Pekanbaru by using direct observation can be seen in Table 5 below:

Table 5
Data of Teacher Performance in Each Subdistrict

No	Subdistrict	Observation		Principal Assesment		Student Percepcion	
		%	Criteria	%	Criteria	%	Criteria
1	Tampan	75,94	Good	83,39	Good	79,80	Good
2	Bukitraya	63,61	Enough	84,19	Good	83,28	Good
3	Limapuluh	78,39	Good	86,61	Very Good	81,41	Good
4	Sail	81,63	Good	80,36	Good	87,27	Very Good
5	Sukajadi	78,81	Good	87,73	Very Good	80,44	Good
6	Senapelan	73,20	Good	82,09	Good	85,15	Very Good
7	Rumbai	68,90	Good	85,58	Very Good	85,99	Very Good
8	Tenayan Raya	76,92	Good	76,64	Good	82,56	Good
9	Marpoyan Damai	77,35	Good	84,00	Good	83,14	Good
10	Rumbai Pesisir	80,94	Good	74,49	Good	81,58	Good
11	Payung Sekaki	78,01	Good	79,03	Good	81,04	Good

FromTable5 it can be seen on each districts that there were no centralization of teacher performance on one particular district. This is in keeping with the spirit of regional autonomy in the areas of education, that the districts are far from the city center (periphery) get the same facilities with the central districts of the city. Sagala (2008: 66) says regional autonomy provincial governments have the duty facilitate district / city, and school to foster and develop the curriculum , fostering and developing school management, fostering the growth of workforce in positions teachers and staff to be more professional, to supervise standards related to institutional , and arrange standardization of educational facilities.

5. Data of Teacher Performance For Individual.

To see the teacher performance for individual, data onthe performanceof teachersfor each individualcan be seenin Table6 below:

Table6
Data of Teacher Performance For Individual

No	Category	Observation		Principal Assesment		Student Percepcion	
		Sum	%	Sum	%	Sum	%
1.	Very Good	10	20	22	44	16	32
2.	Good	36	72	27	54	33	66
3.	Enough	4	8	1	2	1	2
4.	Bad	0	0	0	0	0	0
5	Very Bad	0	0	0	0	0	0

FromTable6it can be seenthat themajorityof teachersin the category ofgoodperformanceand noteacherwhohas aperformance at bad andvery badcategories.

CONCLUSION

From the result of observation, principal's assessment and students' perceptions show that there are two teacher's performance should be greatly improved, namely: (1) utilization of instructional media, and (2) the ability to master and increase between expertise which are taught in the context of life with other knowledge corresponding with the development of science and technology.

From the presentationofresultsandanalysis data above, it can be saidin generalthe performance ofthe teacherhas to be saidgood, althoughthere is stillno improvementincertainindicators, bothofthe observationsin the learning process, assessmentofthe principalorstudentperception, sothe results ofthe studycan beprovide meaningful informationfordecision-makerssuch ascityorprovincialeducation department, department of Education, educationandgeneralobserverfor the sake ofimproving the qualityof educationin Indonesia.

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as a: **PRESENTER**

With the paper entitled

"STUDENT PERCEPTIONS, PRINCIPAL ASSESMENT AND OBSERVATION OF TEACHER PERFORMANCE."

Yogyakarta, May 21, 2014

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