

State University of Makassar

INTERNATIONAL CONFERENCE ON MATHEMATICS,
SCIENCE, TECHNOLOGY, EDUCATION
AND THEIR APPLICATIONS

*"Recent Research and Issues on
Mathematics, Science, Technology, Education
and their Applications"*

PROCEEDINGS
ICMSTE A 2014

Makassar, August 20-21, 2014

ISBN: 979-604-151-0



PROCEEDINGS

INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCE,
TECHNOLOGY, EDUCATION AND THEIR APPLICATIONS
Makassar, August 20-21, 2014

ICMSTE A 2014



979-604-151-0



Conference Proceeding

INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCES, TECHNOLOGY, EDUCATION AND THEIR APPLICATIONS

Makassar, 20th – 21st August 2014

*RECENT RESEARCH AND ISSUES ON MATHEMATICS,
SCIENCE, TECHNOLOGY, EDUCATION AND THEIR
APPLICATIONS*



ICMSTEA 2014

ISBN 979-604-151-0

**Faculty of Mathematics and Science
State University of Makassar**



ICMSTEA 2014: RECENT RESEARCH AND ISSUES ON MATHEMATICS,
SCIENCE, TECHNOLOGY, EDUCATION AND THEIR APPLICATIONS

Editorial Board:

Syafruddin Side
IwanDini
RahmatSyam
SumarlinMus
Ahmad Fudhail
Andi Irma Suryani
Ansari Saleh Ahmar
Muh. AqilRusli
Bustang
Muh. Hijrah
Irwan
IswanAchlanSetiawan
NurWahidinAshari
Wahyuddin Bara
Zulkifli Rais
Sitti Busyrah Muchsin

Reviewer Board:

Prof. Max Warshauer(Texas State University, USA)
Prof. Susie Groves (Deakin University, Australia)
Prof. Peter Hubber (Deakin University, Australia)
Prof. Naoki Sato (Kyoto University, Japan)
Prof. Baharuddinbin Aris(UTM, Malaysia)
Prof. Ismail bin Kailani(UTM, Malaysia)
Prof. DuangjaiNacapricha (Mahidol University, Thailand)
Prof. Muhammad ArifTiro (State University of Makassar, Indonesia)
Prof. SuratmanWoroSuprodjo(GadjahMada University, Indonesia)
Prof. Gufron D. Dirawan (State University of Makassar, Indonesia)
Dr. Fran van Galen(Utrecht University, Netherlands)
Dr. SitiNuramaliatiPriyono(The Indonesian Institute of Sciences)
OslanJumadi, Ph.D. (State University of Makassar, Indonesia)
Muhammad Abdy, Ph.D. (State University of Makassar, Indonesia)
Dr. Suarlin(State University of Makassar, Indonesia)
Dr. Ramlawaty (State University of Makassar, Indonesia)



Forewords from the Head of Committee

Assalamu'alaikum Warahmatullahi Wabarakatuh.

Good morning and may God's blessings be upon us all.

Your Excellency the Rector of State University of Makassar (UNM) Prof. Dr. H. Arismunandar, M.Pd. Ladies and gentlemen, on behalf of the conference committee, first, I would like to give our welcome to all the delegates, keynote speakers, invited speakers, parallel speakers and participants coming today. Welcome to the conference, welcome to State University of Makassar, and welcome to Makassar.

This conference entitled "*International Conference on Recent Research and Issues in Mathematics, Sciences, Technology, Education and Their Applications (ICMSTEA) 2014*". It is assigned to celebrate the 53rd commemoration of State University of Makassar. The conference is organized by the Faculty of Mathematics and Science in conjunction with several committee members from other faculties within State University of Makassar.

Ladies and gentlemen, the conference proudly invites eleven keynote speakers coming from several countries. Therefore, I would like to express my sincere thanks to the keynote speakers, including:

1. Professor Max Warshauer (Texas State University, USA)
2. Professor Naoki Sato (Kyoto University, Japan)
3. Professor Peter Hubber (Deakin University, Australia)
4. Professor Susie Groves (Deakin University, Australia)
5. Dr. Frans Van Galen (Utrecht University, Netherlands)
6. Professor Duangjai Nacapracha (Mahidol University, Thailand)
7. Professor Baharuddin bin Aris (Universiti Teknologi Malaysia, Malaysia)
8. Professor Suratman Woro Suprodjo (Gadjah Mada University, Indonesia)
9. Professor Ismail bin Kailani (Universiti Teknologi Malaysia, Malaysia)
10. Professor Muhammad Arif Tiro (State University of Makassar)
11. Dr. Siti Nuramaliati Priyono (the Indonesian Institute of Sciences)

I would like also to give sincere thanks and gratitude to the invited speakers, including:

1. Prof. Dr. H. Arismunandar, M.Pd. (State University of Makassar)
2. Prof. Kristian H. Sugiyarto, Ph.D (State University of Yogyakarta)
3. Prof. Dr. Sutarto Hadi (Lambung Mangkurat University)
4. Dr. Nurdin Noni, M.Hum (State University of Makassar)
5. Dr. Yuni Sri Rahayu, M.Si. (State University of Surabaya)
6. Dr. Ayuddin M.T. (State University of Gorontalo)
7. Dr. Usman Pagalay (State Islamic University of Malang)
8. Dr. Suyanta, M.Si. (State University of Yogyakarta)
9. Dr. Elisa Sesa, M.Sc. (Tadulako University, Palu)

Next, I want to thank and welcome to 149 parallel speakers and totally, 450 participants approximately are registered to participate from many universities in Indonesia from Aceh to Papua, and other countries. All of them have shared their research and theoretical papers presented and discussed in the conference.



In this occasion, I would like to thanks Deputy of Governor of South Sulawesi Province (Ir. H. Agus Arifin Nu'mang, M.Si), Mayor of Makassar City (Ir. H. Ramdhan Dhany Pomanto), Rector of UNM (Prof. Dr. H. Arismunandar, M.Pd.), and Director of Post Graduate Program of UNM (Prof. H. Jasruddin Daud Malago), who are very kind to be the host of welcoming dinner and lunch during the conference.

I want to thanks also to Kalla Group, KIA Kalla, Erlangga Press, Opti Lab, and e-Bimbel Yogyakarta for their contribution as the sponsors of this conference.

Finally, it is my privilege to thanks all organizing committee members who have been showing good work and determination for the accomplishment of this conference. I would like to apologize to all of you when there are some inconvenience things during the implementation of this conference.

Thank you and wish you have a meaningful conference.

Assalamu'alaikum Warahmatullahi Wabarakatuh.

Head of Committee,

Suwardi Annas, Ph.D.



**Forewords from the Dean of Faculty of Mathematics and Science,
State University of Makassar**

Bismillahirrahmanirrahim
Assalamu'alaikum Warahmatullahi Wabarakatuh

First of all, let us praise to the Almighty, Allah SWT, because of his Blessings and Helps, we are able to gather here to attend the International Conference on Recent Research and Issues in Mathematics, Sciences, Technology, Education and Their Applications (ICMSTEA) 2014.

The development of education and technology in recent decades grows very rapidly. In addition, they have been specialized into many specific topics. Indeed, for researchers and lecturers, being qualified of a specific field as well as being aware of the contemporary development of other fields are two crucial things. One of the reasons why we undertake the conference is to fulfill those two things. By attending the conference, researchers and lecturers have a good opportunity to share their research findings and to obtain broader descriptions of the development of other general knowledge.

We convey our deep appreciation and gratitude to all of the committees that work from the beginning to support and organize the conference. We also strongly expect the participants of the conference to be continually productive, increase the capacity in conducting a research, and carry out both national and international scientific publications.

Finally, let me again recite thank you to the all participants of the conference who are receptive to spend their time to be present and entirely involved at this events. I wish the conference advantageous for all of us.

Billahitaufiq walhidayah,

Wassalamu'alaikum Warahmatullahi Wabarakatuh.

Dean of Faculty of Mathematics and Science
State University of Makassar

Prof. Dr. H. Hamzah Upu, M.Ed.



Forewords from Rector of UNM

Bismillahirrahmanirrahim
Assalamu'alaikum Warahmatullahi Wabarakatuh

Your respectable, the high officials of State University of Makassar, the committee, the speakers, and the participants of conference.

It gives me a great pleasure to extend to you all a very warm welcome, especially to our keynote speakers who have accepted our invitation to attend the conference.

It is an opportune time to convey to you that UNM is celebrating the 53rd Dies Natalis and it commends the faculty of Mathematics and Science (FMIPA) to be in charge of all activity sequences in the Dies Natalis. However, the support of other faculties is also really influential and gives valuable contribution to the success of the event.

In that celebration, we undertake several agendas including educational and sport activities. The conference, ICMSTEA, is one of our educational activities that covers a wide range of very interesting items relating to mathematics, sciences, education, technology and their applications.

By taking participation of this seminar, it is highly expected to all of us to share our research findings to society and continuously develop new ideas and knowledge. Those things are two significant steps in improving the quality of nations around the world, increasing our familiarity to each other, and even avoiding underdevelopment.

On this good occasion, let me quote what Obama said about the education related to this conference and I wish fruitful for all of us:

Every single one of you has something you're good at. Every single one of you has something to offer. And you have a responsibility to yourself to discover what that is. That is the opportunity an education can provide.

Furthermore, I would like to take this opportunity to express my heartfelt gratitude to all organizing committee especially for the Faculty of Mathematics and Science that primarily hosts this conference particularly and other Dies Natalis events generally.

Finally, this is a great time for me to declare the official opening of the International Conference on Recent Research and Issues in Mathematics, Sciences, Technology, Education and Their Applications (ICMSTEA) 2014.

I wish you a very enjoyable stay in Makassar, I warmly welcome you again, as in Makassar, we say "salamakkibatturimangkasara".

Wassalamu'alaikum warahmatullahi wabarakatuh.

Rector of State University of Makassar

Prof. Dr. H. Arismunandar, M.Pd.



TABLE OF CONTENTS

| | |
|---|----|
| WELCOME SPEECH..... | i |
| TABLE OF CONTENTS | iv |
| Designing and Design Research | 1 |
| <i>Frans van Galen, Utrecht University</i> | |
| Mathworks, Math Problems and Math Education Research | 2 |
| <i>Max, Texas State University</i> | |
| Job Orientation of Undergraduate Statistics Students of FMIPA Universitas Negeri Makassar..... | 3 |
| <i>Muhammad Arif Tiro, State University of Makassar</i> | |
| Membraneless Vaporization Devices: Effective On-Line Tools For Separation of Volatile Compounds In Flow-Based Analysis | 4 |
| <i>Nacapricha, D, Uraisin, K, Choengchan, N, Ratanawimarnwong, N. and Wilairat, P, Mahidol University</i> | |
| Correlation Between Structures And Electronic Properties Of Organic Semiconductor Thin Films..... | 5 |
| <i>Naoki Sato, Kyoto University</i> | |
| Stem and Oer To Stimulate Student Engagement | 6 |
| <i>Baharuddin Aris, Universiti Teknologi Malaysia</i> | |
| Representation Construction: A Research Developed Inquiry Pedagogy For Science Education..... | 7 |
| <i>Peter Hubber, Deakin University</i> | |
| Improving Mathematics Teaching Through Lesson Study | 8 |
| <i>Susie Groves, Deakin University</i> | |
| Introduction To Modelling For Geographical Resources Management | 9 |
| <i>Suratman, Gajah Mada University</i> | |
| Role of Biological Sciences In Developing The Scientific Basis For Sustainable Development..... | 10 |
| <i>Siti Nuramaliati Priyono, The Indonesian Institute of Sciences (LIPI)</i> | |
| Mathematics Leadership..... | 11 |
| <i>Ismail Kailani, Universiti Teknologi Malaysia</i> | |
| Developing of School-Based Management Training Model For Principals..... | 12 |
| <i>Arismunandar, Nurhikmah H., WidyaKarmilasari Ahmad, State University of Makassar</i> | |



| | |
|---|-----|
| Analysis of Complex Building Structures Through Cooperative Learning: An Approach Tounderstandcomplexsubjects..... | 18 |
| <i>Ayuddin, Gorontalo State University</i> | |
| Learning Number Pattern Using The Arrangement of Planting Palm Tree | 25 |
| <i>SutartoHadi, Agni Danaryanti, Kamaliyah, Lambung Mangkurat University</i> | |
| Analysis of Dynamic Behavior CD4 ⁺ T Cellsand CD8 ⁺ T Cellstomycobacterium Tuberculosis Infections | 33 |
| <i>Usman Pagalay, Alfi Nur Rochmatin, Islamic State University of Malang</i> | |
| Review On Misconception In Chemistry Textbooks, Teachers And Students Of Senior High School As Users; Case Study On The Concepts Of Quantum Numbers And Electronic Configurations. | 40 |
| <i>Kristian H. Sugiyarto, Yogyakarta State University</i> | |
| Separation of Ca (Ii) And Mg (Ii) Metal Ion Underground River Water In Baron With Activated and Inactivated Zeolite By Fixed Bed Column Adsorption Method | 51 |
| <i>Suyanta, Susila K, Annisa F, Hendarti and Rr. Putri F, Yogyakarta State University</i> | |
| Developing Equivalent Electrical Circuit Model For Organic Photovoltaic Cells..... | 57 |
| <i>Elisa Sesa, Darmawati Darwis, M. Syahrul Ulum, Abdullah, Warwick Belcher, Paul Dastoor, Tadulako University and New Castle University</i> | |
| Isolation And Identification OfHydrocarbon Degradation Bacteria And Phosphate Soluble Bacteria In Lapindo Mud Sidoarjo – East Java | 70 |
| <i>Yuni Sri Rahayu, Yuliani, Guntur Trimulyo, Surabaya State University</i> | |
| The Construction Process of Students' Mathematics Knowledge Based On Cognitive Style In A Learning..... | 80 |
| <i>Abdul Rahman, Ansari Saleh Ahmar, State University of Makassar</i> | |
| Influence of Self-Concept And Learning Interest On Mathematic Achievements of 8 th Grade Students Through Activities and Creative Thinking Ability At Junior High School In Alla Subdistrict at Enrekang District..... | 91 |
| <i>Djadir, State University of Makassar</i> | |
| What Is The Ability of Geosense? | 99 |
| <i>Feny Rita Fiantika, Surabaya State University</i> | |
| Mathematics Learning Based Mathematical Communication Cultured and Character of Indonesia | 103 |
| <i>Izwita Dewi, Tiur Malasari Siregar, Nurhasanah Siregar, MedanState University</i> | |
| Hipnoteaching As A Teaching Model..... | 109 |
| <i>Ja'faruddin, State University of Makassar</i> | |



| | |
|---|------------|
| Student Understanding of Symbols In Math Algebra | 114 |
| <i>Dian Septi Nur Afifah, Surabaya State University</i> | |
| Analysis Of Concept Understanding of Trigonometric Ratio's From Student's Initial Ability On Class X.1 Sma Negeri 11 Makassar | 118 |
| <i>Andi Fauziah Mustafa, Suwardi Annas, Alimuddin, State University of Makassar</i> | |
| Improving College Students' Understanding On Mathematical Finance Course Through The Use of Post-Hypnotic Suggestion of Hypnotherapy | 124 |
| <i>Hamzah Upu, Bustang, State University of Makassar</i> | |
| Designing Learning Continuum As a Basis For Constructing Diagnostic Test (Its Implementation For Algebra Expression) | 129 |
| <i>Kusaeri, Universitas Islam Negeri Sunan Ampel Surabaya</i> | |
| The Development Of Internet-Based Assessment of Math Learning Evaluation | 135 |
| <i>Marwati Abd. Malik, Mas'ud B, University of Muhammadiyah Parepare</i> | |
| The Influence of The Implementation of Unconscious Mind Program To Students' Mathematics Learning Achievement. | 142 |
| <i>Muh. Hijrah, Sabri, Ja'faruddin, State University of Makassar</i> | |
| Development of Teacher Competence Instrument Based On Rating By Students at SMA in Pangkep District | 149 |
| <i>Muhammad Ilham Rauf, Baso Intang Sappaile, Ruslan, State University of Makassar</i> | |
| Learning from Misconception to re-Educate Students In Solving Problems of Mathematics..... | 152 |
| <i>Nasrullah, Usman Mulbar, State University of Makassar</i> | |
| Exploration Of Mathematics Representation In Solving Mathematics Problem Based On the Level of Metacognitive Awareness of Grade X-IPA at SMAN 1 Majene | 160 |
| <i>Nurdin Arsyad, Rezki Amaliyah A. R, State University of Makassar</i> | |
| Problem Based Learning (Pbl) To Enhance Mathematical Analysis And Evaluation Skills of Junior High School Students | 167 |
| <i>NurWahidin Ashari, Dadan Dasari, Stanley Dewanto, University of Education and Padjajaran University</i> | |
| Pre-Service Teachers' Perspective To Identify Evidence Of Teachers' Effort on Developing Democratic Classroom Through Video..... | 174 |
| <i>Rahmah Johar, Cut Khairunnisak, M. Ikhsan, Cut Morina Zubainur, Syiah Kuala University</i> | |
| The Profile of Thinking in Solving Algebra Based On Solo Taxonomy Viewed From The Level of Self-Efficacy At Students of SMP Al-Azhar Palu | 181 |
| <i>Rio Fabrika Pasandaran, Ilham Minggu, Alimuddin, State University of Makassar</i> | |



| | |
|--|-----|
| Is Reforming School Mathematics Curriculum Urgent In Indonesia? | 187 |
| <i>Sabri, Ilham Minggu, State University of Makassar</i> | |
| Mathematics Learning At Non-RME Classroom | 192 |
| <i>Syahrullah Asyari, Ikhbariaty Kautsar Qadry, State University of Makassar and Muhammadiyah University of Makassar</i> | |
| Effect of Cooperative Learning on Mathematics Achievement of Sixth Grade Students of Mendrelgang Primary School In Bhutan | 202 |
| <i>Tulashi Devi Pradhan, Naresuan University, Thailand.</i> | |
| The Description of Mathematical Problem Solving on SPLDV Material Based on Student's Personalities | 213 |
| <i>Muhammad Zainal Abidin, Ilham Minggu, Muh. Jufri, State University of Makassar</i> | |
| Rigorous Mathematical Thinking In Geometry Course | 220 |
| <i>Mega Teguh Budiarto, Pradnyowijayanti, Ikakurniasari, Surabaya State University</i> | |
| Cooperative Interaction In Learning Mathematics | 229 |
| <i>Suradi, State University of Makassar</i> | |
| The Application of The Pigeonhole Principle, Modular Arithmetic, and Permutation in Playing Magical Trick of a Card Game | 236 |
| <i>Fajar Arwadi, State University of Makassar</i> | |
| Influence Theoretical Problem Based Learning Model Cooperative Setting (PBMSK) Against Intelligence Personal Development | 242 |
| <i>Ahmad Talib, Ismail Kailani, Universiti Teknologi Malaysia</i> | |
| The Effect of Student's Learning Style On Student Resistant Misconception In Chemistry Concept | 243 |
| <i>Septyadi David Eka Aryungga, Suyono, State University of Surabaya</i> | |
| The Design Of Instruction Model Based On The Metacognitive Skill For Establishing Problem Solving Ability And The Understanding of Chemical Concept | 250 |
| <i>Ijirana, Tadulako University</i> | |
| Preliminary Analyzes Of Metacognition Awareness And Learning Outcome Of Basic Chemistry For Biology' Students FMIPA UNM | 258 |
| <i>Muhammad Danial, Nurlaela, State University of Makassar</i> | |
| The Relationship Between Prior Knowledge and Creative Thinking Ability In Chemistry of Students In Grade XI Science at Public High School of Takalar | 264 |
| <i>Ramlawati, Dewi Satria Ahmar, Melati Masri, State University of Makassar</i> | |
| Characterization Of Polyblend Of Kelor Seed (<i>Moringa Oleifera</i>) With Eggshell As Adsorben for Water Treatment | 273 |
| <i>Suherman, Sitti Aminah, Solfarina, Tasrik, UIN Makassar</i> | |



| | |
|--|-----|
| Effect Of Learning Model Cycle Learning Through Contextual Approach To Learning Chemistry Class VIII IPA SMP 30 Makassar (Studies In The Subject Matter Of The Chemical) | 281 |
| <i>Ni Luh Asriniasih, Sugiarti, State University of Makassar</i> | |
| Higher-Order Thinking (Hot) SkillsIn UN, TIMSS,and PISA Items | 294 |
| <i>Wasis, Sukarmin, Muji Sri Prastiwi, Surabaya State University</i> | |
| The Changing of Student Healthy Eating Behavior During Study Food Chemistry Based on Social Cognitive Theory | 301 |
| <i>Halimah Husain, Alimuddin, Jasruddin, Sudding, State University of Makassar</i> | |
| Development of Science Practical Courses To Improve The Inquiry Ability of Prospective Teacher | 309 |
| <i>Rosnita, Universitas Tanjungpura Pontianak</i> | |
| Multiple-Choice Exams With Pictorial-To-Pictorial Format Representation of Density of Liquid And Aspect Cognitive Measured..... | 318 |
| <i>Helmi Abdullah, Jasruddin, D.Malago, Patta Bundu, Syamsul Bachri Thalib, State University of Makassar</i> | |
| DevelopingOf Physics Teaching Materials On Based Environmental | 325 |
| <i>Jasruddin, D. Malago, Helmi Abdullah, State University of Makassar</i> | |
| The Influence of Learning Strategies and Cognitive Learning Styles on Learning Outcomes In Physics of Students at SMAN 5 Bulukumba | 330 |
| <i>Kaharuddin Arafah, Kasmiati, State University of Makassar</i> | |
| Development of Web Based Physics Learning Media for 10 th Grade Senior High School In Dynamic Electricity Topic..... | 337 |
| <i>Kiar Vansa Febrianti, Fakhrizal Arsi, State University of Jakarta</i> | |
| Innovative Learning Development Model For Improving High Level Thinking Skills And Student Learning Culture..... | 345 |
| <i>Raharjo, Wahono Widodo, Wasis, Surabaya State University</i> | |
| National Test Quality (UN) at 2012/2013 School Year Of Subjects Physics Lesson Is Evaluated From Difficult Level And Different Power item In Level SMA/MA Study Program Sciences (IPA) In Makassar City..... | 352 |
| <i>S.Salmiah Sari, State University of Makassar</i> | |
| The Influence Of Cooperative Learning Strategies Think Pair Share (TPS) Toward Capability In Probelm Solving Of Ecology With Different Cognitive Style..... | 360 |
| <i>Amiruddin Kasim, Tadulako University</i> | |
| Correlation Student Activity of Creating Concept Map and Concept Map Product That Created by Student With Learning Outcomes On The Nervous System Material In SMA Negeri 10 Bulukumba..... | 368 |
| <i>Asmayani, State University of Makassar</i> | |



| | |
|---|-----|
| Study on Learning Process (Project Based Learning) in Environment Science Course..... <i>Baiq Fatmawati, STKIP Hamzanwadi-Selong</i> | 376 |
| The Development Of Chart-Based Instructional Media Of Biology As Biocompass For Protists Subject Grade X Semester I <i>Engka Rukmana, Nurhayati B, Andi Rahmat Saleh, State University of Makassar</i> | 380 |
| Scientific Inquiry Skills of Preserved Biology Teacher In Laboratory Activity <i>Fenny Roshayanti, Sumarno, Muhammad Syaipul Hayat, PGRIUniversity of Semarang</i> | 389 |
| Utilization of Simple Microscope as Alternative Media at Basic Competency 6.3 Describe The Diversity of Life Organizational System From Cells To Organism at Class VII MTSN Turikale Kabupaten Maros..... <i>Kasmiatang Kadir, MTSN Turikale Kabupaten Maros</i> | 396 |
| Item Test Analyzing for Odd Semester Examination of Biology Matter In Class XI Senior High Schools In Tamalanrea District at Makassar City for Academic Years 2013/2014 <i>Muhammad Takwin Machmud, Hardiyanti M, Yusminah Hala, A. Mushawwir Taiyeb, State University of Makassar</i> | 402 |
| The Different Of Science Cognitive Learning Outcome On The Respiratory System By Using Problem Based Instruction Model With Demonstration Method And Without Demonstration Method In Class VIII MTSN Kelara..... <i>Nurul Fatimah Syukri, Firdaus Daud, A. Asmawati Azis, State University of Makassar</i> | 412 |
| Implementation of Representation Visuospatial (Vs) Teaching In Cell Biology Concept for Undergraduate Students Mathematics and Biology Education <i>Purwati Kuswarini Suprpto, Universitas Siliwangi</i> | 420 |
| Relationship Analysis of Sportin Creating Fasting with The Student Health Aspects Science Foundation Islamic School Foundation Sciences of The Qur'an Al-Muzahwirah Makassar <i>Muhammadong, Arifuddin Usman, State University of Makassar</i> | 425 |
| Evaluation on Managerial Supervision Program Secondary Education Unit of Supervisors In Poso District <i>Yunita Timbani, MakassarState University</i> | 432 |
| Knowledge and Attitude of Primary School Teacher Candidates The Portofolio Assessment <i>Andi Makkasau, Patta Bundu, State University of Makassar</i> | 438 |
| Correlation Islamic Values Against Sport In Creating Emotional Intelligence In Students Aliyah Islamicschool An-Nahdlah Makassar..... <i>Arifuddin, U, Muhammadong, State University of Makassar</i> | 447 |



| | |
|--|-----|
| Analysis Of The Roles Of School Supervisors In Guiding Teachers To Conduct Classroom Action Research At Senior High School In Bulukumba District..... <i>Erny, State University of Makassar</i> | 456 |
| Using Laboratory Simulation In Vocational High School To Model Real World Problems <i>Hendra Jaya, Sapto Haryoko, State University of Makassar</i> | 460 |
| Vocational Education Reform In a Global Era..... <i>Muhammad Yahya, Muhammad Farid, State University of Makassar</i> | 466 |
| The Readiness of Students, Vocational High School Building Engineering Department, and Construction Industry In Applying Internship Program In Makassar City <i>Onesimus Sampebua, Anas Arfandi, State University of Makassar</i> | 476 |
| Rearranging Free Education Policy In Indonesia(Case Study: Free Education Policy In Makassar) <i>Suarlin, State University of Makassar</i> | 482 |
| Utilizing Audio Visual (VCD) To Improve Reproduction Written Skill In English Learning of Teacher Training of Elementary School Program (PGSD)..... <i>Rohana, State University of Makassar</i> | 492 |
| The Impact of Policy on Region Expansion To Office Administrative Services In Barombong Subdistrict of Gowa District..... <i>Rudi Salam, Rosdiana, Suarlin, Haedar Akib, State University of Makassar</i> | 505 |
| Procedures of Constructing Tests by The High School English Teachers In Makassar..... <i>Suhartina A. Busrah, Baso Jabu, Muhammad Nasiruddin Sainu, State University of Makassar</i> | 513 |
| The Development of Science and Technology Through The Professionalism of Lecturers <i>Syamsidah, State University of Makassar</i> | 521 |
| Positive Expectation Model Development Education Improvement Efforts As A Stress Self-Management Skills Student Vocational High School (SMK) Makassar <i>Abd Saman, Muh Jufri, State University of Makassar</i> | 527 |
| Application of Structural Equation Modelling (SEM) With Analysis Of Moment Structures (AMOS) <i>Suwardi Annas, Irwan, State University of Makassar</i> | 534 |
| Developing Students Books With Topics Matrix Based On Rigorous Mathematical Thinking (RMT) In Curriculum 2013 <i>Ika Kurniasari, Pradnyo Wijayanti, Mega Teguh Budiarto, State University of Surabaya</i> | 541 |
| Homomorphisms and Isomorphisms In The Fuzzy Subgroup <i>Sukmawati, Fitriani, STKIP YPUP Makassar</i> | 545 |



| | |
|--|-----|
| Approximate Analytical Solution for SIR Model of Dengue Disease In South Sulawesi Using Homotopy Analysis and Iteration Variation Method | 548 |
| <i>Syafruddin S., Yulita Molliq Rangkuti, State of Makassar, Medan State University</i> | |
| Stability Analysis of System of 1 Prey – 2 Predator With Holling Type II Functional Response | 557 |
| <i>Abadi, Surabaya State University</i> | |
| Portfolio Optimization Analysis of Stock Using Markkowitz Model | 561 |
| <i>Ansari Saleh Ahmar, State University of Makassar</i> | |
| Evolution Equation of Homogeneous Semi-Markov Processes In Health Insurance Additional Premiums Calculation for Outpatient Respiratory Disease | 565 |
| <i>Faihatuz Zuhairoh, STKIP YPUP Makassar</i> | |
| Survival Analysis and Its Application In Public Health | 574 |
| <i>Aswi, State University of Makassar</i> | |
| Optimal Control of the Forest Arealogistic Growth Model Preserving the Stable Interaction of Temperature, Pressure And Atmospheric CO ₂ Content | 582 |
| <i>Agus Indra Jaya, Rina Ratianingsih, Affandi, Tadulako University</i> | |
| Measurability of The Henstock Integrable Function of Vector Valued Function On a Locally Compact Metric Space | 588 |
| <i>Manuharawati, Surabaya State University</i> | |
| Application of SIR Mathematical Model for Transmission of Dengue Fever Through Collaboration Counseling with Health Center Staff In Lanrisang, Pinrang | 593 |
| <i>Syafruddin Side., State University of Makassar</i> | |
| Lattices as Ordered Sets | 596 |
| <i>Fitriani, Bahar, UIN Alauddin Makassar, State University of Makassar</i> | |
| Contemporary Correlation | 599 |
| <i>Sukarna, State University of Makassar</i> | |
| Screening of Tembelekang Plant (<i>Lantanacamaralinn</i>) Active Compounds for Prevention of Infectious Diseases in skin wounds | 605 |
| <i>Muharram, Iwan Dini, Pince Salempa, Sitti Faika, Ahmad Fudhail, State University of Makassar</i> | |
| Performance of The Diffusive Gradients In Thin Films (DGT) Technique for Measurement of Labile Cu In Environmental Waters | 611 |
| <i>Khairuddin, Abd Wahid Wahab, Buchari, Indah Raya, Tadulako University, Hasanuddin University, Bandung Institute of Technology</i> | |



| | |
|--|-----|
| Cadmium: a Micronutrient for Diatom Marine Phytoplankton <i>Arifin, M. Sjahrul, Ahyar Ahmad, Indah Raya, Halu Oleo University</i> | 618 |
| Antibiotic Activity Test Cellulolytic Bacteria Isolates CC1 And CC2 of The Larvae of The Butterflies (Cossus cossus) <i>Maswati Baharuddin, Abd. Rauf Patong, Ahyar Ahmad, Nursiah La nafie, University of Hasanuddin</i> | 627 |
| Synthesis and Characterization of Coke From Charcoal Obtained From Pyrolysis of Coconut Shell <i>Meytij Jeanne Rampe, Vistarani Arini Tiwow, State University of Manado, State University of Makassar</i> | 632 |
| Isolation and Structure Elucidation of B-Sitosterol Compound from The N-Hexane Fraction of Root Wood of Pterospermum Subpeltatum C.B. Rob <i>Pince Salempa, State University of Makassar</i> | 638 |
| Synthesis of Pesticides Organic of Kirinyuh (Chromolaena Odonata) for Armyworm and Caterpillar Soil Pest on Cabbage and Scallion <i>Ignatius R.S. Santoso, Henny L. Rampe, Manado State University, Sam Ratulangi University</i> | 644 |
| Synthesis Molecular Imprinted Polymer Methacrylic Acid (MIP_MAA) using Molecular Imprinting Technique <i>St. Fauziah, Nunuk Hariani, Muh. Bachri Amran, Paulina Taba, Hasanuddin University, Technology Institute of Bandung</i> | 647 |
| Structure-Activity Relationship for Larvacidal Activity of Non-Phenolic Compounds from The Stem Bark of Red Mangrove (<i>Rhizophora Stylosa</i>) <i>Suyatno, Nurul Hidajati, Surabaya State University</i> | 653 |
| The Influence of Variation In The Amount of Starch Adhesive on The Calorific Value of Coconut Shell Charcoal Briquettes <i>Sudding, State University of Makassar</i> | 658 |
| Design of Bentonite Acid Modified Electrodes In Cyanide Biosensors..... <i>Catherina Bijang, Abd. Wahid Wahab, Maming, Ahyar Ahmad, Paulina Taba, Pattimura University, Hasanuddin University</i> | 666 |
| Analyse of Water Flow, Rainfall and Evaporation In Maros Karst Areas and Sustainable Use In Agriculture <i>Muhammad Arsyad, State University of Makassar</i> | 674 |
| Immunohistochemical Study on The Distribution of Adenohypophyseal Cell Types In The Pituitary Gland of Bungo Fish (<i>Glossogobius Cf. Aureus</i>) from Tempe Lake, South Sulawesi <i>Dwi Kesuma Sari, Andi Tamsil, Kazuhide Adachi, Yasuhiro Tsukamoto, Hasanuddin University, Indonesian Moslem University, Kyoto Prefecture University</i> | 682 |



| | |
|--|-----|
| A Study on The Topographical of Syrinx In Laughing Chicken (Ayam Gaga) From South Sulawesi | 686 |
| <i>Andhika Yudha Prawira, Novi Susanty, Farida Nur Yuliaty, Dini Kurnia Ikliptikawati, Dwi Kesuma Sari, Hasanuddin University</i> | |
| Programmable Logic Controller(PLC)-Based Coin-Operated Automatic Charging Station..... | 692 |
| <i>Julius O. Paler, Southern Leyte State University</i> | |
| Computation Model For The FEB/FE ₂ B Layer Growth Diffusion Kinetic During The ST41 Low Carbon Steel Powder Pack Boriding | 695 |
| <i>Sutrisno, State Islamic University Syarif Hidayatullah Jakarta</i> | |
| Level Relations In The Field Of Health Services Clinic Sanitation By The Numbers Disease Occurrence Environment Based On Work Are A Community Health Center Makassar | 701 |
| <i>Zaenab, Mawaddah, Ministry of Health Polytechnic Makassar</i> | |
| Temperature Trend Analisis In Jakarta City: 1981-2010 | 711 |
| <i>Rosmini Maru, State University of Makassar</i> | |
| Petrography of Pyrite Minerals from Mineral Deposits Kecamatan Bontocani Kabupaten Bone | 719 |
| <i>Nurhayati, State University of Makassar</i> | |
| The Diversity of Anopheles Sppmosquitos Species In Traditional Mining Areas Ondistrict of Rarowatu Utara, Bombana Regency | 724 |
| <i>Amirullah, Nasaruddin, Waode Harlis, Husnaeni, Halu Oleo University, Open University Makassar</i> | |
| Phosphate-Solubilizing Actinomycetes Isolated From Rhizosphere of <i>Manihot Utilisima</i> In South Sulawesi | 734 |
| <i>Alimuddin Ali, Nurlaela Alydrus, Moh. Sahrul Tamsil, Andi Asrini Nurani Ulfa, Muslimin, State University of Makassar</i> | |
| Mi Lela (Mi Lele Labu): Manufacturing The Wet Noodle From Flour And Clarias Batrachus Flesh With Fortification of Pumpkin | 738 |
| <i>Andi Nurul Virninda, Sriwidayani Syam, Nuraini Yusuf, Sri Wahyuni, and Reski Ramadani, State University of Makassar</i> | |
| Development of Biology Instructional Media Based E-Learning Using Joomla and Wondershare Quiz Creator For Skeletal and Muscular System Concept | 745 |
| <i>Anshar Mansabadi, Asmawati Azis, State University of Makassar</i> | |
| Identification of Physical And Social Ecotourism Potential In Ramma Valley at Bawakaraeng Mountain South Sulawesi | 753 |
| <i>Mohamad Padri, Surianto, Andi Andriana, Aji Maulana, A. Nurul Virninda, State University of Makassar</i> | |



| | |
|--|-----|
| Diversity and Indicator Species of Herbaceous Understory Vegetation at Forest Dominated With <i>Vitex Cofassus</i> On Mount Bawakaraeng | 760 |
| <i>Muhammad Wiharto, Hamka L, Fatma H, Syamsiah, Abdul Hamid, Satriani,</i> State University of Makassar | |
| Developing Students' Leader Character Through Sekolah Alam (A Case Study In Sekolah Alam Bogor Middle School Level) | 770 |
| <i>Nurhikmah Tenripada,</i> State University of Makassar | |
| The Effect of Different Grains On Oyster Mushroom (<i>Pleurotus Ostreatus</i>) Spawn Growth | 776 |
| <i>Rukman Muslimin, A. Mu'nisa, Alimuddin Ali, Hartono, Oslan Jumadi,</i> State University of Makassar | |
| Content of Flavonoid Compounds of <i>Ageratum Conyzoides</i> Leaves Extract From Some Altitude Habitats | 780 |
| <i>Yuliani, Soemarno, Bagyo Yanuwadi, Amin Setyo Leksono,</i> Brawijaya University | |
| Mohs Micrographic Modification Surgery In Handling And Rotation Flap Basal Cell Carcinoma | 786 |
| <i>Irma Suryani, Anis Idris, Anis Irawan Anwar,</i> State University of Makassar, Hasanuddin University | |
| Marica Goat's Response To The Provision of Superior Feed | 792 |
| <i>Rosdiana Ngitung,</i> State University of Makassar | |
| Improvement of DPRD Monitoring Model In The Implementation of The Government and Development to Realize Good Governance In Sinjai Regency In South Sulawesi | 799 |
| <i>Hasnawi Haris, Manan Sailan, Rifdan,</i> State University of Makassar | |
| Effect of Organizational Commitment Transformational Leadership Mediates On The Performance of Employees (Study On Islamic Banking In Makassar)..... | 811 |
| <i>Akbar Abdi,</i> State University of Makassar. | |
| Society Opinion's Regarding Residential House and Its Environment Toward Human Basic Need In Makassar (In Review Of Physiological And Safety Needs Or Sense Of Security) | 824 |
| <i>Agussalim Djirong,</i> State University of Makassar | |
| Development of Model-Based Learning Visual Media Through The Model Four-D Thiagarajan For Expository Writing In Junior High School | 837 |
| <i>Akmal Hamsa, Ihramsari Akidah,</i> State University of Makassar | |
| The Factors Affecting Inflation In Indonesia | 846 |
| <i>Anwar Ramli, Sulfaidah,</i> State University of Makassar | |



| | |
|--|-----|
| Y Organ Cells Activity Based On The Concentration Of Ecdysteroid From Haemolymph of Mangrove Crab (<i>S. Olivacea Herbs</i> , 1979) | 861 |
| <i>Hasnidar, Yushinta Fujaya, Dody Dharmawan Trijuno, Chair Rani,</i> Indonesian Moslem University, Hasanuddin University | |
| Joke Models of Development Result and Benefits | 872 |
| <i>Jokebet Saludung</i> , State University of Makassar | |
| The Role of Heavy Metal Fe In Sponges (Porifera) From Spermonde Archipelago | 879 |
| <i>Lydia Melawaty, Kristiana Pasau</i> , Paulus Christian University of Indonesia | |
| Application of Dynamic Model as Decision Making In Vehicle Emissions Pollution Control At Makassar City | 884 |
| <i>Moh. Ahsan S. Mandra</i> , State University of Makassar | |
| Challenges Facing Economic Education In A Free Trade (ACFTA and AEC) | 891 |
| <i>Muhammad Azis</i> , State University of Makassar | |
| The Application of Learning Group Investigation Model to Improve Students' Learning Outcome of Agricultural Technology Education Department | 898 |
| <i>Nurleala S.</i> , State University of Makassar | |
| The Pakarena Sere Jaga Nigandang, Culture Identity and Makassar Women | 905 |
| <i>Nurlina Syahrir</i> , State University of Makassar | |
| Air Pollution Control In The Region of Makassar Indonesia..... | 920 |
| <i>Taty</i> , State University of Makassar | |
| Fuzzy Logic Method to Diagnose Fault In 1-Phase Induction Motor | 930 |
| <i>Yunus Tjandi, Dyah Darma Andayani, Syarifuddin Kasim</i> , State University of Makassar | |
| Optimization the Learning Based Competence Integrated With Character Education In Vocational High School | 937 |
| <i>Riana T. Mangesa, Dyah Darma Andayani</i> , State University of Makassar | |
| Analysing Items Using the Rasch Model In Pisa 2000 | 942 |
| <i>Muhammad Tahir</i> , State University of Makassar | |
| Accuracy Improvement of Sound Absorption Measurement of Material Using Ensemble- Averaging Method With Pu Sensor | 951 |
| <i>Asniawaty</i> , Hasanuddin University | |
| Enhanced Fatigue Characteristics of Copper Microstructures Due To Equal Channel Angular Pressing (Ecap) Process | 959 |
| <i>Kusno Kamil</i> , Indonesian Moslem University | |
| Die Fähigkeit Des Hörverstehens Der Deutschen Dialoge Durch Audio-Medien | 967 |
| <i>Laelah Azizah, Suryaty Pasa', Syukur Saud</i> , State University of Makassar | |



| | |
|---|-----|
| Effect Sizes on Econometric Models Using Cohen's f | 974 |
| <i>Hisyam Ihsan</i> , State University of Makassar | |
| The Facts about the Use of Technology in English Language Teaching at Senior Secondary Schools | 983 |
| <i>Nuridin Noni</i> , State University of Makassar | |
| Instructional Design of PMRI: Investigating Students' Understanding on Angle Comparison | 993 |
| <i>Sitti Busyrah Muchsin, Achmad Dany Fahrudin, Ummy Salmah</i> , Sriwijaya University | |
| Students' Mathematical Communication Ability in Linear Programming with Problem Solving Approach Cooperative Setting Based on Cognitive Style on Grade XII Exact SMA Negeri 1 Kelara Kabupaten Jenepono | 999 |
| <i>Rahmat H.S., Awi Dassa, & Muhammad Darwis M.</i> State University of Makassar | |

IS REFORMING SCHOOL MATHEMATICS CURRICULUM URGENT IN INDONESIA?

Sabri¹, Ilham Minggu²

^{1,2}Department of Mathematics, Faculty of Mathematics and Natural Science
State University of Makassar, Makassar, Indonesia
e-mail address: ibesabri@yahoo.com

Abstract

The reformed curriculum for school mathematics in Indonesia has been implemented on a massive scale and it has invited various criticisms. The critics focus mainly on the three reasons for the reform. Firstly, it is believed that the 2004 Curriculum is outdated. Secondly, the reformers say that it could not be implemented effectively by teachers. The third reason is that it has failed to raise the rank of Indonesian students in international assessment programs. In the new curriculum, teachers are given the instructional package complete and ready to implement in the classroom. The development of syllabi and lesson plans is no longer fully assigned to the teachers. With fewer burdens, they are expected to focus on teaching practice and ensuring that the instructional objectives are achieved by their students. With this policy, the teacher empowerment is in question. It has been warned not to treat teachers as mere executors of prescribed syllabi, thus inevitably limiting their chance to innovate. This paper will examine the reasons for the reform and argue about the importance of continuing professional development in order to produce competent teachers.

Keywords: Curriculum reform, school mathematics, continuous professional development.

1. Introduction

The reformed curriculum for school mathematics in Indonesia has been implemented on a massive scale and it has invited various criticisms. The critics focus mainly on the reasons for the reform which have been expressed by the representatives of the government. The Ministry of Education and Culture give three main reasons for reforming the mathematics curriculum yet again. Firstly, they believe that the 2004 Curriculum is outdated. Secondly, they say that it could not be implemented effectively by teachers. Their third reason is that it has failed to raise the rank of Indonesian students in international assessment programs. This essay will examine these reasons. It will then argue that the government must focus its attention on conducting continuing professional development in order to produce competent teachers rather than reform the curriculum through the preparation of ready-to-use instructional packages.

The government has taken a considerably greater portion in the development of the 2013 Curriculum than it did in that of the 2004 Curriculum. In the new curriculum, the development team gives the teachers the instructional package complete and ready to implement in the classroom (Kasim, 2013, p. 45). Thus, the development of syllabi and lesson plans is no longer fully assigned to the teachers. By significantly lessening their burden as regards preparation of the courseware, it is expected that the teachers will focus on teaching practice and ensure that the instructional objectives are achieved by their students. With this policy, the empowerment of the teachers is in question. Regarding teacher empowerment, Laukkanen (2008, p. 319) warns us not to treat teachers as mere executors of prescribed syllabi, thus inevitably limiting their chance to innovate.



2. An Outdated Curriculum

It has been argued that the 2004 Curriculum is already out of date. According to the government representatives, this curriculum will not be able to fulfill the demands of society resulting from the changes which have taken place during the past decade. They claim that its contents are irrelevant to the current circumstances in Indonesia. Therefore, they say, this curriculum must be reformed as today's citizens will need new competencies which are not accommodated by it. According to Kasim (2013, p. 27), a new curriculum is needed which aims at producing Indonesian citizens who are productive, creative, innovative, and caring through strengthening attitude, skills, and knowledge in an integrated manner. In addition to these, the qualities of being communicative, thinking clearly and critically, being morally aware, tolerant of differences and able to live in the global community, to name just a few, should characterize Indonesian citizens who will be educated using the new curriculum (Kasim, 2013, p. 11).

However, the government seems to exaggerate its arguments. Regarding the age of a curriculum, ten years definitely does not matter. Indeed, there is no evidence that the 2004 Curriculum was projected to be implemented for only ten years. Moreover, the length of the implementation period depends mostly on the quality of a curriculum, not merely on its age. The Principles and Standards for School Mathematics (NCTM, 2000) in the US are an excellent curriculum example, which are still being used now after having been implemented for around 14 years. In fact, they were taken as an influencing example when the 2004 Curriculum was developed. Therefore, the government should not be trapped in a traditional tendency to reform the curriculum every ten years. The other reason given, i.e. the absence of several qualities in the previous

curriculum, lacks justification, because a careful scrutiny of it reveals that actually it does not lack the qualities and noble mission mentioned earlier. Moreover, it is surprising that the government should suddenly take this so-called lack to be a drawback of the curriculum because, previously, most curriculum stakeholders had agreed that it was not necessary for such competencies and mission to be stated explicitly either in the curriculum texts or in instructional packages. Indeed, the curriculum assumed that they were set as implicit 'nurturant effects' (Vora, 2006, p. 112), meaning that they were achieved by students through experiencing the instructional activities. They are not to be taught; rather, they must be exemplified by the teachers in their daily activities in the school; also they must be embodied in the teaching and learning processes which were experienced by the students. Unfortunately, in implementing the previous curriculum the teachers had failed to interpret and transfer the curriculum mission and qualities into real instructional practices, and it was clearly due to incompetence on the part of the teachers.

3. Teachers' Failure

Teachers' failure to implement the 2004 Curriculum is given as another argument for reforming it. The curriculum specified 'standard competencies and 'basic competencies' nationally as ultimate learning goals to be achieved by students in all levels of school. To ensure that the students succeeded in achieving the prescribed objectives, the teachers were assigned to develop their own syllabi, lesson plans and learning resources appropriate to the context of their students' life. According to Poedjinoegroho (2013), the great amount of autonomy given to teachers to develop a school-based curriculum has turned out to be counterproductive as teachers apparently failed to do this. The government does realize that the teachers' failure in the

previous curriculum was mainly due to their low capacity of pedagogy and knowledge of mathematics. In fact, the results of the online teacher competence tests focusing on both theory of pedagogy and mathematics contents administered by the Ministry of Education and Culture in 2012 revealed that certified mathematics teachers of junior secondary schools could only attain the low average score of 51 out of 100, and those of senior secondary schools attained an even lower average score of 42 of 90 (Gultom, 2012). Generally, it means that they could answer only around 50% of the question items correctly. To end the story, instead of addressing the problems of teacher quality, the government's response was to produce a new curriculum as a ready-to-use package providing teachers with only very limited autonomy to develop their own.

However, the response is not unproblematic. For one, it is contrary to the spirit of a democratic education system where teachers are greatly empowered to ensure the attainment of instructional objectives and, at the same time, achieve job satisfaction as a professional. For this matter, Hargreaves, Lieberman, Fullan, and Hopkins (2010, p. xv) remind us that the most successful countries in the sector of education did not employ full top-down control, but allowed their fully competent teachers to be more flexible and innovative in the instructional process. Related to this warning, instead of changing the curriculum, a more rational and empowering action should be to focus on continuously improving the quality of the teachers so that they are capable of implementing it. McKinsey and Company (2007, p. 13) strongly believe that improvement of the quality of education as indicated by improved instructional outcomes absolutely requires competent teachers. Mentioning Finland as an example, Darling-Hammond (2009, p.19) points out that to produce highly competent teachers needs an investment in

teacher training; if this is done, then schools can be given more autonomy to decide the contents and the teaching methods appropriate for their students. Another problem is that the current curriculum reform functions to "reverse the effects of the earlier policy" (Laukkanen, 2008, p. 319). The Indonesian government has actually invested a considerable part of its budget to train school mathematics teachers to be professionals with wider curricular authority. Moreover, to improve the teachers' professionalism, it has been implementing the teacher certification program. Unfortunately, the certification which cost around Rp60 trillion (Kamdi, 2010) in the period of 2006-2010 only resulted in the fact, as mentioned by Widiyanto (2011), that the certified teachers do not perform better than the uncertified ones. Thus, there is a huge question about the quality of training the teachers have received.

4. Curriculum Failure

Proponents of the reform have judged the previous curriculum a failure. It has not succeeded in educating Indonesian students to be internationally competitive. The critics point out that in the Programme for International Students Assessment 2012, Indonesian students' literacy in mathematics ranked the second lowest out of 65 participating countries (OECD, 2013, p. 19). Similarly, the results of the Trend in International Mathematics and Science Study 2011 showed that Indonesia ranked 38th out of 45 participating countries (Mullis, Martin, Foy, & Arora, 2012, p. 42). They attributed this failure to the curriculum, saying that it neither teaches mathematics literacy nor prepares students to be cognitively competent in mathematics. Further, the government claims that the curriculum was not compatible with PISA standards, and therefore, additional competencies should be put in the new curriculum. Kasim

(2013, p. 3) believes that by teaching the same standardized PISA contents, Indonesian students can reach the same performance level as their counterparts in well-performing countries, such as Taiwan. The problem of low ranks of Indonesia, however, does not relate mainly to the contents as the curriculum certainly deals with mathematics literacy. Authorities, such as Kasim (2013), seem to ignore the aspect of how the contents are taught by teachers of what qualities. Darling-Hammond (2009) contends that the contents of a curriculum can actually be modified to suit the students' needs by teachers who are highly trained. Taiwan is an example where teachers teach contents which are compatible to PISA and set in learning activities matching PISA's mathematical cycle (Lee, 2013). Quoting a study in Boston, McKinsey and Company (2007, p. 12) find that "students placed with high-performing teachers will progress three times as fast as those placed with low-performing teachers." Thus, when we aim at trying to improve students' performance, once again, quality teachers are a much more decisive factor than curriculum contents.

5. Continuous Professional Development

Apparently, the reasons for reforming the curriculum all converge into the problem of the teachers' quality. Therefore, instead of reforming the curriculum, the government must focus on improving the quality of the mathematics teachers. Daniel Rosyid, an expert in education, clearly states that Indonesia is currently in need of teacher reform, not curriculum reform (Ya'kub, 2013). The best way of achieving this reform is by conducting continuous professional development programs. The programs must ensure that all the components of supervision, mentoring, evaluation and monitoring function effectively and efficiently. They must aim at producing professional, experienced,

and highly trained teachers who are able not only to creatively cope with any curriculum initiative but also to develop their own curriculum. The teachers must be constantly empowered through a sustainable system of training with long term objectives. The government has several exemplary models of professional development programs which have been successfully implemented in Indonesia such as the "Decentralized Basic Education 2" program funded by USAID (Jalal et al, 2009, p. 29).

Training a huge number of teachers requires a huge budget. However, with the commitment of the government to utilize some portion of the national budget allocated for the Ministry of Education and Culture, such an endeavour is affordable. Moreover, teachers can contribute financially to their own training; as for teachers who have been certified, a certain percentage of their certification salary should be used to improve their professionalism. In the long run, given the benefit the teachers gain from the continuous professional development, Darling-Hammond (2009, p. 24) assures us that they will eventually regard it as their "right rather than an obligation."

6. Conclusion

In a nutshell, the results of the international assessments should not outweigh the results of the teachers' competency test. The other point is that the curriculum contents should not be blamed for the students' low achievement. Becoming mathematically literate and competent is not about the subject contents we learn; it is about the way we learn and transform the knowledge into a form that can effectively solve real life non-routine problems. Teacher capacity improvement must be prioritized first. If the teachers are not trained appropriately to perform their assignments more professionally, we might be disappointed by similar poor results

from our students in international assessment programs in the next decade.

References:

1. Darling-Hammond, L. (2009). Steady work: Finland builds a strong teaching and learning system, *Voices in Urban Education*, 24(Summer), 15-25.
2. Gultom, S. (2012). *Uji Kompetensi Guru Online*. Accessed from: <http://ukg.kemdikbud.go.id/info/>
3. Hargreaves, A., Lieberman, A., Fullan, M., & Hopkins, D. (Eds.) (2010). Introduction: Ten Years of Change. In A. Hargreaves, A. Lieberman, M. Fullan, & D. Hopkins (Eds.), *Second International Handbook of Educational Change Part 1* (pp. xi-xxii). Dordrecht: Springer.
4. Jalal, F., Samani, N., Chang, M. C., Stevenson, R., Ragatz, A. B., & Negara, S. D. (2009). *Teacher Certification in Indonesia: A strategy for teacher quality improvement*. Ministry of National Education of Indonesia and World Bank. Retrieved from: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/05/21/000333037_20090521004718/Rendered/PDF/485780WP0Box331ication0in0Indonesia.pdf.
5. Kamdi, W. (2010). Sertifikasi Guru. *Kompas*, p. 7, November 24, 2010.
6. Kasim, M. (2013). *Kurikulum 2013*. Paper presented in Sosialisasi Kurikulum 2013 di Sulawesi Selatan, February 8-9, 2013 at State University of Makassar, Makassar Indonesia.
7. Laukkanen, R. (2008). Finnish strategy for high-level education for all. In N. C. Soguel & P. Jaccard (Eds.), *Governance and performance of education systems* (pp. 305-324). Dordrecht, Netherlands: Springer.
8. Lee, S. (2013). *PISA functional literacy as represented in Taiwanese mathematics textbooks*. Unpublished Doctoral Dissertation. Columbia University.
9. McKinsey & Company. (2007). *How the world's best-performing school systems come out on top*. Retrieved from: http://www.mckinsey.com/client-service/socialsector/resources/pdf/Worlds_School_Systems_Final.pdf.
10. Mullis, I. V. S., Martin, M. O., Foy, P., & Arora, A. (2012). *TIMSS 2011 International Results in Mathematics*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center and International Association for the Evaluation of Educational Achievement.
11. NCTM. (2000). *Principles and Standards for School Mathematics*. Reston, VA: The National Council of Teachers of Mathematics, Inc.
12. OECD. (2013). *PISA 2012 results: What students know and can do – Student performance in mathematics, reading and science (Volume I)*. Paris: OECD Publishing.
13. Poedjinoegroho, B. (2013). Awas, Jangan Salahkan Guru. *Media Indonesia*, p. 6, March 7, 2013.
14. Vora, P. (2006). Effective Teaching of Concepts: Theory and Application. In S. Tiwari (Ed.), *Education in India* (pp. 109-115). New Delhi: Atlantic.
15. Widiyanto, Y. N. (2011). Guru Bersertifikasi, di Mana Dikau? *Kompas*, p. 6, May 7, 2011.
16. Ya'kub, E. M. (2013). Catatan kritis untuk kurikulum 2013. *Antaranews.com*, May 19, 2013. Accessed from: <http://www.antaranews.com/berita/375517/catatan-kritis-untuk-kurikulum-2013>.