

**PROSIDING  
SEMINAR NASIONAL JURUSAN  
MATEMATIKA 2023**

**“Transformasi Matematika dan Teknologi Menuju Generasi Matematika  
Unggul untuk Pendidikan Indonesia Maju”**

**Kamis, 9 November 2023  
Aula lantai 3 Gedung FMIPA**

**Penyelenggara :**

**Jurusan Matematika  
Fakultas Matematika dan Ilmu Pengetahuan Alam  
Universitas Negeri Medan**

*THE*  
*Character Building*  
*UNIVERSITY*



**PROSIDING SEMINAR NASIONAL  
JURUSAN MATEMATIKA 2023**

**“Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk Pendidikan Indonesia Maju”**

Penyelenggara :  
Jurusan Matematika FMIPA - UNIMED

**PROFIL PENERBIT**

**Nama Penerbit :**

Lembaga Penerbitan dan Publikasi UNIMED PUBLISHER  
Universitas Negeri Medan.

Layout :

*Team*

Desain Cover:

*Team*

**Redaksi :**

Lembaga Penerbitan dan Publikasi UNIMED PUBLISHER  
Universitas Negeri Medan.  
Jalan Willem Iskandar Pasar V – Kotak Pos Nomor 1589 – Medan 20221  
Telepon/WA 0822 – 6760 – 0400, Email : [publisher@unimed.ac.id](mailto:publisher@unimed.ac.id)  
Website : <https://publisher.unimed.ac.id>

*Hak Cipta © 2023. Dilindungi oleh Undang – Undang  
Dilarang memperbanyak karya tulis ini dalam bentuk dan dengan cara apapun  
tanpa izin Tim Penulis dan penerbit.*

ISBN : 978-623-5951-32-4  
978-623-5951-33-1 (EPUB)

**TIM REDAKSI PROSIDING  
SEMINAR NASIONAL JURUSAN MATEMATIKA  
FMIPA UNIVERSITAS NEGERI MEDAN**

**“Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk  
Pendidikan Indonesia Maju”**

**Universitas Negeri Medan, 09 November 2023**

- Pengarah** : Prof. Dr. Fauziyah Harahap, M.Si.  
Dr. Jamalum Purba, M.Si.  
Dr. Ani Sutiani, M.Si.  
Dr. Rahmatsyah, M.Si.
- Penanggungjawab** : Dr. Pardomuan Sitompul, M.Si.
- Reviewer** : Dr. Hamidah Nasution, M.Si  
Dr. Izwita Dewi, M.Pd.  
Dr. Kms. Muhammad Amin Fauzi, M.Pd.  
Dr. Hermawan Syahputra, S.Si., M.Si.  
Dr. Arnita, M.Si.  
Dr. Mulyono, S.Si., M.Si.  
Dr. Elmanani Simamora, M.Si.  
Yulita Molliq Rangkuti, S.Si., M.Sc., Ph.D.  
Lasker Sinaga, S.Si., M.Si.  
Nurhasanah Siregar, S.Pd., M.Pd.  
Said Iskandar Al Idrus, S.Si., M.Si.  
Sudianto Manullang, S.Si., M.Sc.  
Didi Febrian, S.Si., M.Sc.
- Editor** : Dian Septiana, S.Pd., M.Sc.  
Dinda Kartika, S.Pd., M.Si.  
Nurul Maulida Surbakti, M.Si.  
Nadrah Afiati Nasution, M.Pd.  
Adidtya Perdana, S.T., M.Kom
- Desain Sampul** : Dedy Kiswanto, S. Kom., M. Kom.

## SUSUNAN PANITIA

**Ketua:**

Susiana, S.Si., M.Si.

**Sekretaris:**

Suvriadi Panggabean, M.Si.

**Sekretariat:**

Ade Andriani, S.Pd., M.Pd.

Nurul Ain Farhana, M.Si.

Sisti Nadia Amalia, S.Pd., M.Stat.

Andrea Arifsyah Nasution, S.Pd., M.Sc.

Arnah Ritonga, S.Si., M.Si.

**Publikasi:**

Insan Taufik, S.Kom., M.Kom

Dinda Kartika, S.Pd., M.Si.

Dian Septiana, S.Pd., M.Sc.

Putri Maulidina Fadilah, M.Si.

Fevi Rahmawati Suwanto, S.Pd., M.Pd.

Putri Harliana, S.T., M.Kom.

Nadrah Afiati Nasution, M.Pd.

**Acara:**

Hanna Dewi Marina Hutabarat, S.Si., M.Si.

Marlina Setia Sinaga, S.Si., M.Si.

Chairunisah, S.Si., M.Si.

Eri Widyastuti, S.Pd., M. Sc.

Kairuddin, S.Si., M.Pd.

Dr. Nerli Khairani, M.Si.

Dr. Faiz Ahyaningsih, M.Si.

**Logistik:**

Muhammad Badzlan Darari, S.Pd., M.Pd.

Ichwanul Muslim Karo Karo, M. Kom.

Denny Haris, S.Si., M.Pd.

Faridawaty Marpaung, S.Si., M.Si.

Dra. Katrina Samosir, M.Pd.

**Humas & Dokumentasi:**

Sri Lestari Manurung, S.Pd., M.Pd.

Tiur Malasari Siregar, S.Pd., M.Si.

Dra. Nurliani Manurung, M.Pd.

Nurul Maulida Surbakti, M.Si.

Adidtya Perdana, S.T., M.Kom.

Dedy Kiswanto, S. Kom., M. Kom.

## KATA PENGANTAR KETUA PANITIA

Segala puji dan syukur kepada Allah SWT atas terbitnya Prosiding Seminar Nasional Jurusan Matematika (SEMNASATIKA) FMIPA Universitas Negeri Medan. Prosiding ini merupakan kumpulan artikel ilmiah yang telah dipresentasikan pada kegiatan SEMNASATIKA 09 November 2023 di Aula Gedung Prof. Syawal Gultom, Universitas Negeri Medan. Adapun cakupan bidang kajian yang disajikan dalam prosiding ini meliputi Matematika, Statistika, Ilmu Komputer, dan Pendidikan Matematika.

Dengan mengangkat tema seminar, “Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk Pendidikan Indonesia Maju”, kami mengharapkan SEMNASATIKA dapat turut serta berkontribusi bagi perkembangan ilmu pengetahuan jurusan matematika sebagai wadah bagi para peneliti, praktisi, penggiat pendidikan matematika dan pengguna untuk terjalinnya komunikasi dan diseminasi hasil-hasil penelitian.

Kegiatan SEMNASATIKA dan prosiding ini dapat diselesaikan dengan baik tidak terlepas dari bantuan berbagai pihak, oleh sebab itu kami mengucapkan banyak terimakasih kepada:

1. Pimpinan Universitas Negeri Medan
2. Dekan FMIPA dan para Wakil Dekan FMIPA Universitas Negeri Medan
3. Para Narasumber yaitu Bapak Prof. Dr. Janson Naiborhu, M.Si., Bapak Mangara Marianus Simanjorang, M.Pd., Ph.D dan Bapak Ahmad Isnaini, M.Pd.
4. Ketua Jurusan Matematika FMIPA Universitas Negeri Medan
5. Para Ketua Program Studi di Jurusan Matematika Universitas Negeri Medan
6. Panitia SEMNASATIKA
7. Pemakalah dan Peserta SEMNASATIKA
8. Semua pihak yang terlibat dalam pelaksanaan SEMNASATIKA

Kami menyadari bahwa buku prosiding ini masih jauh dari kata sempurna, karena itu kami mengharapkan kritik dan saran yang membangun dari para pembaca untuk perbaikan selanjutnya. Akhirnya, kami menghaturkan maaf jikalau ada hal-hal yang kurang berkenan bagi para pembaca serta ucapan terimakasih kepada semua pihak yang telah berkontribusi bagi terbitnya buku prosiding ini. Semoga buku prosiding ini dapat memberikan manfaat sesuai dengan yang diharapkan.



Medan, November 2023  
Ketua Panitia,

Susiana, S.Si., M.Si.  
NIP.197905192005012004

**KATA PENGANTAR**  
**DEKAN FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM**  
**UNIVERSITAS NEGERI MEDAN**

Puji dan Syukur kepada Allah SWT atas segala rahmat dan anugerah-Nya sehingga Prosiding Seminar Nasional Jurusan Matematika dengan tema “Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk Pendidikan Indonesia Maju” yang diselenggarakan oleh Jurusan Matematika FMIPA Universitas Negeri Medan pada hari Kamis, 09 November 2023 di Medan dapat diselesaikan.

Publikasi prosiding ini bertujuan untuk memperluas wawasan pengetahuan yang berasal dari para akademisi baik dari Universitas Negeri Medan maupun yang berasal dari luar Universitas Negeri Medan. Selain itu, prosiding ini juga sebagai sarana untuk mengkomunikasikan hasil penelitian dengan menyajikan topik-topik terbaru yang meliputi bidang Pendidikan Matematika, Statistika, Ilmu Komputer dan Matematika.

Kami mengucapkan terimakasih dan apresiasi yang setinggi-tingginya kepada semua pihak yang telah berkontribusi dalam Seminar Nasional Jurusan Matematika, baik sebagai keynote speakers yaitu Prof. Dr. Janson Naiborhu, M.Si., Mangara Marianus Simanjorang, M.Pd., Ph.D dan Ahmad Isnaini, M.Pd., reviewer makalah, peserta dan panitia yang terlibat. Akhir kata, semoga Prosiding Seminar Nasional Jurusan Matematika ini bermanfaat bagi kita semua sehingga dapat memberikan kontribusi maksimal bagi negara dan bangsa.



Medan, November 2023

Prof. Dr. Fauziah Harahap, M.Si  
NIP. 196607281991032002



**KATA PENGANTAR**  
**KETUA JURUSAN MATEMATIKA**  
**FMIPA UNIVERSITAS NEGERI MEDAN**

Dengan penuh rasa syukur kepada Allah SWT, prosiding Seminar Nasional Jurusan Matematika FMIPA Universitas Negeri Medan ini dapat diselesaikan. Kemajuan ilmu pengetahuan dan teknologi di era ini sangat berdampak bagi kehidupan manusia. Kajian penelitian terkait perkembangan ilmu pengetahuan dan teknologi serta terapannya perlu disosialisasikan kepada khalayak. Seminar Nasional Jurusan Matematika merupakan forum diskusi ilmiah yang sangat penting dalam pengembangan dan penyebaran pengetahuan di bidang matematika yang meliputi pendidikan matematika, statistika, ilmu komputer dan matematika (non pendidikan). Melalui buku prosiding ini, kami berupaya untuk menyajikan rangkuman makalah-makalah yang telah dipresentasikan, serta memberikan wadah bagi pembaca untuk menjelajahi gagasan-gagasan cemerlang yang ditawarkan dan penelitian-penelitian terkini yang dihasilkan oleh para akademisi, peneliti, dan praktisi matematika.

Tema seminar kali ini, “Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk Pendidikan Indonesia Maju”, mencerminkan komitmen kami untuk terus menghadirkan diskusi yang relevan dan mendalam mengenai isu-isu terkini dalam dunia matematika. Melalui buku ini, kami berharap pembaca dapat mengeksplorasi berbagai sudut pandang, temuan, dan pemikiran-pemikiran baru yang dapat memperkaya wawasan serta menginspirasi penelitian dan pengembangan dan ilmu matematika.

Secara khusus, kami mengucapkan terimakasih kepada para narasumber, yaitu : Prof. Dr. Janson Naiborhu, M.Si., Mangara Marianus Simanjorang, M.Pd., Ph.D dan Ahmad Isnaini, M.Pd., yang telah membagikan ilmunya dalam kegiatan seminar. Terimakasih yang tulus juga kami sampaikan kepada semua pihak yang telah mendukung kegiatan ini, para pimpinan Universitas Negeri Medan dan para pimpinan FMIPA Universitas Negeri Medan. Apresiasi yang tinggi juga saya ucapkan teruntuk para penulis, reviewer, dan panitia yang telah berperan aktif dalam pembuatan buku prosiding ini. Kontribusi dari setiap individu adalah pondasi kesuksesan acara ini, dan semangat kolaboratif ini sangat berharga bagi perkembangan ilmu matematika.

Akhirnya, kami berharap buku prosiding ini dapat menjadi sumber pengetahuan yang bermanfaat dan memotivasi pembaca untuk terus menggali potensi dalam bidang matematika. Mari kita bersama-sama memperkuat dan memajukan ilmu matematika demi keberlanjutan pembaruan pengetahuan.

Medan, November 2023

Ketua Jurusan Matematika



Dr. Pardomuan Sitompul, M.Si  
NIP.196911261997021001

## SUSUNAN ACARA

Waktu	Kegiatan	PIC
08.00 - 08.30	Pendaftaran Ulang	Panitia
08.30 - 09.00	Acara Pembukaan 1. Salam Pembuka  2. Menyanyikan Lagu Indonesia Raya 3. Doa 4. Laporan Ketua Pelaksana 5. Sambutan dan Pembukaan acara seminar oleh Dekan Fakultas Matematika dan Ilmu Pengetahuan Alam 6. Foto Bersama	MC: Putri Maulidina Fadilah, S.Si., M.Si Nurul Ain Farhana, M.Si  Khairuddin, M.Pd. Susiana, S.Si., M.Si. Prof. Dr. Fauziyah Harahap, M.Si
09.00 - 10.00	Pembicara I  Prof. Dr. Janson Naiborhu, M.Si (Guru Besar Matematika ITB)	Moderator:  Yulita Molliq Rangkuti, M.Sc., Ph.D
10.00 - 11.00	Pembicara II  Mangaratua Marianus Simanjorang, M.Pd. Ph.D (Dosen Jurusan Matematika UNIMED)	Moderator:  Andrea Arifsyah Nasution, S.Pd., M.Sc.
11.00 - 11.45	Pembicara III  Ahmad Isnaini, M.Pd (Guru berprestasi Nasional)	Moderator:  Dinda Kartika, S.Pd., M.Si.
11.45 - 13.00	ISOMA	
13.00 - 14.30	Sesi I : Seminar Paralel	Moderator  Pemakalah Pendamping
14.30 - 16.00	Sesi II: Seminar Paralel	Moderator  Pemakalah Pendamping
16.00	Penutupan acara oleh Dekan FMIPA	MC



## KEYNOTE SPEAKER

### KEYNOTE SPEAKER 1

#### **Prof. Dr. Janson Naiborhu, S.Si., M.Si.**



Prof. Janson Naiborhu memiliki dua gelar doktor yang ia peroleh dari Keio University (Jepang) dan Institut Teknologi Bandung. Kariernya sebagai dosen dimulai sejak tahun 1991, sejak ia bergabung sebagai Dosen FMIPA ITB, dengan Kelompok Keahlian Matematika Industri dan Keuangan. Ia menjadi Guru Besar sejak 1 Desember 2014 dan Pembina Utama Muda/Gol IV C sejak 1 April 2011.

Prof. Janson aktif dalam melakukan riset dan telah banyak menghasilkan jurnal ilmiah baik nasional maupun internasional. Namanyapun telah dikenal luas di dunia pendidikan dan industri, khususnya dalam bidang Matematika.

### KEYNOTE SPEAKER 2

#### **Mangaratua M Simanjorang, M.Pd., Ph.D**



Mangaratua M Simanjorang, M.Pd., Ph.D adalah dosen Pendidikan Matematika di Universitas Negeri Medan. Beliau meraih gelar sarjana di Universitas HKBP Nomensen tahun 2003, dan di tahun 2007 beliau mendapat gelar magister dari Universitas Negeri Surabaya. Beliau melanjutkan program doktor di Murdoch University, Australia dan memperoleh gelar Ph.D tahun 2016. Fokus pada pendidikan matematika, beliau melaksanakan tridarma universitas, beliau mendapatkan penghargaan sebagai dosen muda terbaik tahun 2009.

Dengan menjadi reviewer dan narasumber dibanyak kegiatan seminar, beliau berbagi ilmu dalam bidang pendidikan matematika, pendidikan karakter dan media pembelajaran seperti *augmented reality*.

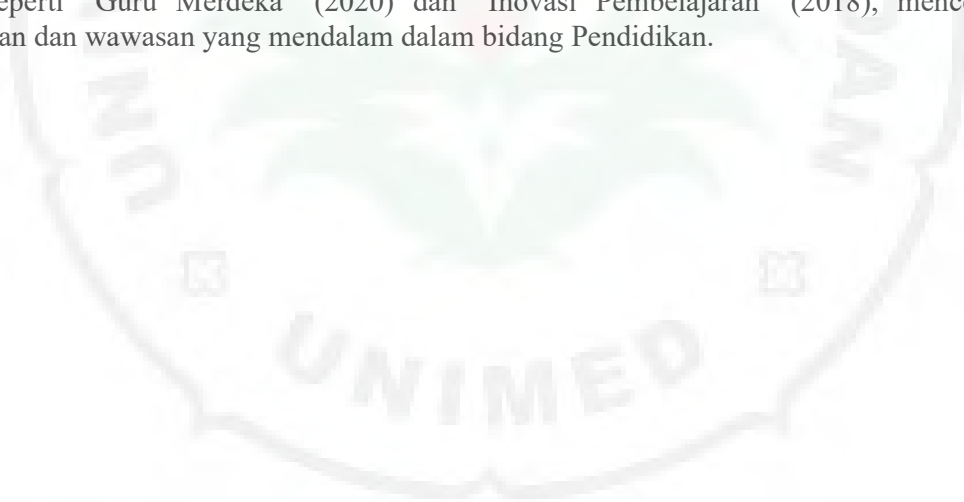
### KEYNOTE SPEAKER 3

## Ahmad Isnaini M.Pd.



Ahmad Isnaini, M.Pd adalah seorang pendidik yang memiliki dedikasi tinggi terhadap dunia pendidikan. Ia meraih gelar Sarjana Pendidikan Matematika dari Universitas Negeri Medan pada tahun 2010, kemudian melanjutkan studi pascasarjana dan meraih gelar Magister Pendidikan Matematika pada tahun 2019 dari universitas yang sama. Saat ini, Ahmad sedang mengejar gelar Doktor dalam bidang yang sama di Universitas Negeri Medan.

Ahmad Isnaini juga telah mengukir prestasi gemilang dalam berbagai kompetisi dan olimpiade. Sebagai Finalis Apresiasi GTK 2023 BBGP Sumatera Utara Tingkat Provinsi dan penerima berbagai medali emas, perak, dan perunggu dalam Olimpiade Guru tingkat Nasional dan Provinsi, Ahmad Isnaini memperlihatkan dedikasinya dalam pengembangan kemampuan diri dan juga siswanya. Tidak hanya aktif di dunia akademis, Ahmad Isnaini juga telah berkontribusi dalam literatur pendidikan. Karya-karyanya yang terpublikasi dalam jurnal nasional dan internasional, serta buku-buku seperti "Guru Merdeka" (2020) dan "Inovasi Pembelajaran" (2018), mencerminkan pemikiran dan wawasan yang mendalam dalam bidang Pendidikan.



## DAFTAR ISI

	Hal
Halaman Cover .....	ii
Tim Redaksi .....	iii
Susunan Kepanitiaan .....	iv
Kata Pengantar Ketua Panitia .....	v
Kata Pengantar Dekan FMIPA .....	vi
Kata Pengantar Ketua Jurusan Matematika .....	vii
Rundown Acara .....	viii
Keynote Speaker .....	ix
Daftar Isi .....	xi

<b><u>Bidang Ilmu : Pendidikan Matematika</u></b> .....	1
<b>PENGEMBANGAN MEDIA PEMBELAJARAN VIDEO ANIMASI BERBASIS PENDEKATAN PEMBELAJARAN KONTEKSTUAL UNTUK MENINGKATKAN MINAT BELAJAR SISWA SMP NEGERI PERISAI</b>	
Dara Kartika, Syawal Gultom .....	2 -11
<b>PENGEMBANGAN BAHAN AJAR MATEMATIKA BERNUANSA ETNOMATEMATIKA UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA</b>	
Ikke Fatma, Katrina Samosir .....	12 - 21
<b>PENGARUH MODEL PEMBELAJARAN BERBASIS MASALAH BERBANTUAN MEDIA GEOGEBRA TERHADAP KEMAMPUAN KONEKSI MATEMATIS SISWA SMP N 35 MEDAN</b>	
Yulan Sari Dalimunthe, Pardomuan Sitompul .....	22 - 29
<b>PENGARUH PENDEKATAN <i>REALISTIC MATHEMATICS EDUCATION</i> TERHADAP KEMANDIRIAN BELAJAR MATEMATIKA SISWA KELAS VII DI SMP NEGERI 5 PERCUT SEI TUAN</b>	
Annisa Wahyuni Hasibuan, Mangaratua M. Simanjourang .....	30 - 38
<b>ANALISIS KEMAMPUAN BERPIKIR KREATIF SISWA KELAS VII SMP DITINJAU DARI KEPERIBADIAN <i>EKSTROVERT</i> DAN <i>INTROVERT</i> YANG DIBELAJARKAN DENGAN MODEL PEMBELAJARAN BERDASARKAN MASALAH</b>	
Yana Tasya Damanik, Michael C Simanullang .....	39 - 47
<b>PERBEDAAN KETERAMPILAN BERPIKIR KRITIS MATEMATIS ANTARA SISWA YANG BELAJAR MELALUI MODEL <i>THINKING ALOUD PAIR PROBLEM SOLVING</i> BERBANTUAN SOFTWARE GEOGEBRA DENGAN YANG BELAJAR MELALUI MODEL KONVENSIIONAL DI SMAS SANTA LUSIA SEI ROTAN</b>	
Fransiskus J.P.S., Waminton R. ....	48 - 56
<b>PENGARUH MODEL <i>GAME BASED LEARNING</i> BERBANTUAN WEB <i>EDUCANDY</i> TERHADAP MOTIVASI BELAJAR MATEMATIKA SISWA PADA MATERI ARITMATIKA SOSIAL DI KELAS VII SMP NEGERI 35 MEDAN</b>	
Agusti Eka Wardani, Pardomuan Sitompul .....	57 - 65
<b>PENERAPAN MODEL PEMBELAJARAN BERBASIS MASALAH UNTUK MENINGKATKAN PENALARAN MATEMATIS SISWA DI KELAS VIII SMP NEGERI 28 MEDAN</b>	

Frida Yanti Br Lumban Batu, Hamidah Nasution .....	66 - 75
<b>PENERAPAN MODEL PEMBELAJARAN KOOPERATIF TIPE STAD BERBANTUAN CABRI UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIKA SISWA KELAS VII DI SMP NEGERI 29 MEDAN.....</b>	
Ewilda Sinaga, Zul Amry .....	76 - 83
<b>PENGEMBANGAN LKPD BERBASIS PENDEKATAN MATEMATIKA REALISTIK UNTUK MENINGKATKAN KEMAMPUAN KOMUNIKASI MATEMATIS SISWA KELAS VII SMP NEGERI 35 MEDAN</b>	
Dea Aulia Rahma Rangkuti, Nurhasanah Siregar .....	84 - 92
<b>PENGARUH MODEL PEMBELAJARAN MATEMATIKA <i>KNISLEY</i> DENGAN BERBANTUAN APLIKASI GEOGEBRA TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA SMP</b>	
Lina Sehat Sitanggang, Nurliani Manurung.....	93 - 103
<b>PENGEMBANGAN E-LKPD BERBASIS <i>DISCOVERY LEARNING</i> BERBANTUAN <i>KVISOFT FLIPBOOK MAKER</i> UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF SISWA KELAS XI SMA</b>	
Rio Marcellino Sinaga, Marojahan Panjaitan .....	104 - 114
<b>PENERAPAN MODEL PEMBELAJARAN <i>DISCOVERY LEARNING</i> UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VII/I SMP NEGERI 2 MEDAN</b>	
Fadila, Asmin .....	115 - 123
<b>ANALISIS KEMAMPUAN BERPIKIR KRITIS BERBASIS PENDEKATAN <i>REALISTIC MATHEMATICS EDUCATION</i> SISWA KELAS XI SMA NEGERI 17 MEDAN</b>	
Ricardo Manik, Zul Amry .....	124 - 133
<b>PENINGKATAN MINAT BELAJAR MATEMATIKA SISWA MENGGUNAKAN MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> BERBANTUAN MEDIA KOMIK DI SMP NEGERI 7 MEDAN</b>	
Sova Yunita Ritonga, Mukhtar .....	134 - 142
<b>ANALYZING STUDENTS' MATHEMATICAL LITERACY OF SMP SWASTA MUHAMMADIYAH 21 DOLOK BATU NANGGAR USING PISA-BASED QUESTIONS</b>	
Dhea Anisah Putri, Mangaratua Marianus Simanjorang .....	143 - 154
<b>PENGEMBANGAN MEDIA PEMBELAJARAN AUDIO VISUAL BERBANTUAN APLIKASI CAPCUT UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VII SMP MUHAMMADIYAH 03 MEDAN</b>	
Nur Fidyati Ramadhan, Nurhasanah Siregar.....	155 - 163
<b>PENGEMBANGAN MEDIA PEMBELAJARAN GEOGEBRA BERBASIS MODEL PEMBELAJARAN KOOPERATIF TIPE STAD DI KELAS X SMAN 4 BINJAI</b>	
Angela Farida P. Sitorus, Pargaulan Siagian .....	164 - 172
<b>PERBEDAAN ANTARA MODEL PEMBELAJARAN KOOPERATIF TIPE TPS DAN EKSPOSITORI TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA DI KELAS XI SMA NEGERI 1 BATANG KUIS</b>	
Yemima Eymizia Silaban, Waminton Rajagukguk .....	173 - 181

<b>PENERAPAN MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> BERBANTUAN APLIKASI GEOGEBRA UNTUK MENINGKATKAN PEMAHAMAN KONSEP MATEMATIKA SISWA KELAS VIII SMP</b>	
Areigi Doanta Sembiring, Izwita Dewi.....	182 - 191
<b>PENGARUH MODEL PEMBELAJARAN KOOPERATIF TIPE TWO STAY TWO STRAY TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA PADA SISWA KELAS VIII DI SMP NEGERI 2 PANCUR BATU</b>	
Sri Windi Br Ginting, Wingston L. Sihombing.....	192 - 200
<b>PERBANDINGAN ANTARA MODEL PEMBELAJARAN <i>PROJECT BASED LEARNING</i> DAN MODEL PEMBELAJARAN KONVENSIIONAL TERHADAP KEMAMPUAN PEMAHAMAN KONSEP MATEMATIS SISWA</b>	
Ezra Pebiola Lumbantobing, Tiur Malasari Siregar.....	201 - 206
<b>THE EFFORTS TO IMPROVE STUDENTS' ABILITY IN UNDERSTANDING MATHEMATICAL CONCEPT WITH MISSOURI MATHEMATIC PROJECT LEARNING MODEL IN GRADE VIII OF SMP NEGERI 1 AIR PUTIH</b>	
Nurul Afifah Syahputri, Hasratuddin .....	207 - 214
<b>PENERAPAN MODEL PEMBELAJARAN MATEMATIKA REALISTIK BERBANTUAN GEOGEBRA UNTUK MENINGKATKAN KEMAMPUAN SPASIAL SISWA SMP NEGERI 23 MEDAN</b>	
Dewi Ramadhani, Hasratuddin .....	215 - 223
<b>PENERAPAN MODEL PEMBELAJARAN KOOPERATIF TIPE <i>TEAM ASSISTED INDIVIDUALIZATION</i> UNTUK MENINGKATKAN KEMAMPUAN KOMUNIKASI MATEMATIS SISWA KELAS VIII SMP PAB 8 SAMPALI</b>	
Muhammad Zulham Syahputra, Nurhasanah Siregar .....	224 - 232
<b>PENGEMBANGAN BAHAN AJAR E-MODUL MENGGUNAKAN APLIKASI <i>KVISOFT FLIPBOOK MAKER</i> BERBASIS MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> DI SMP NEGERI 16 MEDAN</b>	
Vanny Rahmadani, Yasifati Hia .....	233 - 240
<b>PENGARUH KEMAMPUAN KOMUNIKASI MATEMATIS, KEMAMPUAN VISUAL, KEMAMPUAN SPASIAL DAN KEMAMPUAN LITERASI MATEMATIS TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIKA SISWA</b>	
Vinky Ruth Amelia Br Hasibuan, Edi Syahputra .....	241 - 249
<b>PENERAPAN MODEL PEMBELAJARAN KOOPERATIF TIPE STAD BERBANTUAN <i>SOFTWARE</i> GEOGEBRA UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VIII</b>	
Nurhalimah Manurung, Mukhtar .....	250 - 259
<b>PENGEMBANGAN MEDIA PEMBELAJARAN INTERAKTIF BERBASIS PBL BERBANTUAN WEBSITE CANVA UNTUK MENINGKATKAN PEMAHAMAN KONSEP MATEMATIS SISWA</b>	
Aisah Queenela Br Pelawi, Prihatin Ningsih Sagala.....	260 -269
<b>EFEKTIVITAS MODEL PEMBELAJARAN KOOPERATIF TIPE <i>TEAMS GAMES TOURNAMENT</i> UNTUK MENINGKATKAN PEMAHAMAN KONSEP MATEMATIS SISWA</b>	
Veronica Gulo, E. Elvis Napitupulu .....	270 - 279

**PENGARUH MODEL PEMBELAJARAN *PROBLEM BASED LEARNING* MENGGUNAKAN CABRI 3D TERHADAP KEMAMPUAN SPASIAL SISWA KELAS VIII**

Anggry F Hutasoit, Mangaratua Marianus Simanjorang .....280 - 286

**PENERAPAN MODEL PEMBELAJARAN *PROBLEM BASED LEARNING* UNTUK MENINGKATKAN KEAKTIFAN BELAJAR SISWA PADA PEMBELAJARAN MATEMATIKA**

Mastiur Santi Sihombing, Syawal Gultom.....287 - 294

**PENGARUH MODEL PEMBELAJARAN KOOPERATIF TIPE *PAIR CHECK* TERHADAP KEMAMPUAN PEMAHAMAN KONSEP MATEMATIS SISWA KELAS VIII MTs NEGERI 1 SIMALUNGUN**

Lifia Humairah, Hamidah Nasution .....295 - 301

**PERBEDAAN KEMAMPUAN KONEKSI MATEMATIS SISWA YANG DIAJAR MELALUI MODEL PEMBELAJARAN BERBASIS MASALAH DAN KONVENSIIONAL DI KELAS VIII SMP NEGERI 7 MEDAN**

Audita Marselina Manik, Waminton Rajagukguk.....302- 310

**THE IMPLEMENTATION OF COOPERATIVE LEARNING MODEL STAD TYPE TO IMPROVE STUDENTS' PROBLEM-SOLVING ABILITY IN CLASS VII SMP NEGERI 37 MEDAN**

Evelyn Angelika, Nurhasanah Siregar .....311 - 318

**IMPLEMENTASI *VIDEO EXPLAINER* SEBAGAI STRATEGI DALAM PENINGKATAN KEMAMPUAN PEMECAHAN MASALAH SISWA**

Nurul Bahri, Suci Frisnoiry .....319 - 327

**UPAYA MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF SISWA KELAS VIII SMP NEGERI 17 MEDAN MELALUI PENERAPAN PEMBELAJARAN REALISTIC MATHEMATICS EDUCATION**

Feby Greciana Damanik, Bornok Sinaga ..... 328 - 337

**UPAYA MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VIII SMP PERGURUAN KEBANGSAAN MELALUI PENERAPAN MODEL PEMBELAJARAN *PROBLEM BASED LEARNING* BERBANTUAN AUTOGRAPH**

Yuli Masita Sari, Bornok Sinaga ..... 338 - 346

**PENGUNAAN MEDIA BELAJAR E-MODUL TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA DI KELAS VIII SMP**

Maria Nadia Sirait, Nurhasanah Siregar ..... 347 - 355

**PENGEMBANGAN E-MODUL INTERAKTIF MENGGUNAKAN FLIP PDF PROFESSIONAL BERBASIS PENDEKATAN RME UNTUK MENINGKATKAN KEMAMPUAN VISUAL THINKING SISWA KELAS VIII DI SMP SWASTA PRAYATNA MEDAN**

Pelni Rodearni Sipakkar, Kms. Muhammad Amin Fauzi ..... 356 - 363

**PENERAPAN MODEL PEMBELAJARAN *PROBLEM BASED LEARNING* DENGAN PENDEKATAN *OPEN-ENDED* UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH SISWA KELAS XI SMA MATEMATIKA**

Oswaldo Raphael Sagala, Sri Lestari Manurung .....	364 - 372
<b>ANALISIS KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA SMA</b> Aprizal, E. Elvis Napitupulu .....	373 - 382
<b>PENGARUH MODEL PEMBELAJARAN <i>BRAIN BASED LEARNING</i> BERBANTUAN <i>BRAIN GYM</i> TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA KELAS VIII SMP</b> Syahir Sasri Habibi, Izwita Dewi .....	383 - 391
<b>PENERAPAN MODEL PEMBELAJARAN KOOPERATIF TIPE STAD BERBANTUAN GEOGEBRA UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VIII SMP</b> Vida Gresiana Dachi, Mukhtar .....	392 - 400
<b>IMPLEMENTATION OF RECIPROCAL TEACHING LEARNING MODEL TO IMPROVE STUDENTS' MATHEMATICAL REPRESENTATION ABILITY IN GRADE VII AT SMP NEGERI 37 MEDAN</b> Royana Chairani, Hasratuddin .....	401 - 407
<b>PENGEMBANGAN MEDIA PEMBELAJARAN INTERAKTIF BERBASIS POWERPOINT DAN ISPRING DI ANDROID UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA</b> Dita Aryani, Katrina Samosir .....	408 - 417
<b>PERBEDAAN PENINGKATAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIKA SISWA MENGGUNAKAN MODEL <i>PROBLEM BASED LEARNING</i> DAN MODEL KOOPERATIF TIPE STAD SMA NEGERI 1 PERBAUNGAN .....</b> Christian Javieri Andika, Sri Lestari Manurung .....	418 - 425
<b>PENGARUH PENDEKATAN PEMBELAJARAN MATEMATIKA TERHADAP KEMAMPUAN LITERASI NUMERASI MATEMATIS SISWA SMP NEGERI 2 PERCUT SEI TUAN</b> Fauziyyah, Dian Armanto .....	426 - 435
<b>PENERAPAN MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> DENGAN PENDEKATAN <i>CREATIVE PROBLEM SOLVING</i> UNTUK MENINGKATKAN KEMAMPUAN PEMAHAMAN KONSEP MATEMATIS SISWA MTsN 1 ACEH TENGGARA</b> Naila Fauziah, Asrin Lubis .....	436 - 445
<b>IMPLEMENTASI MODEL PEMBELAJARAN <i>LEARNING CYCLE 5E</i> UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA SMA</b> Wilson Sihotang, Nurliani Manurung .....	446 - 453
<b>THE IMPLEMENTATION OF PROBLEM BASED LEARNING MODEL ASSISTED BY GEOGEBRA SOFTWARE TO IMPROVE STUDENTS' MATHEMATICAL PROBLEM-SOLVING ABILITY IN GRADE X AT SMA NEGERI 8 MEDAN</b> Grace Margareth Stevany Sinurat *, Pardomuan N.J.M Sinambela .....	454 - 461
<b>PENGEMBANGAN MEDIA PEMBELAJARAN VIDEO ANIMASI UNTUK MENINGKATKAN MINAT BELAJAR MATEMATIKA SISWA KELAS X.....</b> Marince, Katrina Samosir .....	462 - 471

<b>PENGEMBANGAN MEDIA PEMBELAJARAN MATEMATIKA INTERAKTIF BERBASIS RME BERBANTUAN <i>SOFTWARE ISPRING</i> DALAM MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA</b> Rupina Aritonang, Edi Syahputra.....	472 - 480
<b>ANALYSIS OF STUDENT’S MATHEMATICAL COMMUNICATION ABILITY IN THE IMPLEMENTATION OF THE JIGSAW TYPE COOPERATIVE LEARNING MODEL IN SMP NEGERI 35 MEDAN</b> T. Asima Sulys Simanjuntak, Bornok Sinaga.....	481 - 490
<b>PENGARUH PEMBELAJARAN MATEMATIKA MENGGUNAKAN MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> TERHADAP KEMAMPUAN BERPIKIR KRITIS SISWA SMK</b> Enikristina Simbolon, Edy Surya .....	491 - 500
<b>PENERAPAN MODEL PEMBELAJARAN <i>MISSOURI MATHEMATICS PROJECT</i> UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS XI DI SMAN 1 KEJURUAN MUDA</b> Hanifah Rusydah, Katrina Samosir.....	501 - 506
<b>INCREASED UNDERSTANDING OF MATHEMATICAL CONCEPTS AND MOTIVATION WITH A PROBLEM POSING APPROACH ON CLASS VIII MTs NEGERI 2 RANTAUPRAPAT</b> Miftahul Jannah, Nurhasanah Siregar .....	507 - 511
<b>PENGEMBANGAN LKPD MATEMATIKA BERBASIS STEM UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH SISWA KELAS VIII SMP Parah Galu Pangestu, Kms. Muhammad Amin Fauzi.....</b>	512 - 519
<b>PENGEMBANGAN MEDIA AUDIO VISUAL BERDASARKAN MODEL PEMBELAJARAN SAVI UNTUK MENINGKATKAN KEMAMPUAN PENALARAN MATEMATIS SISWA SMA NEGERI 1 TAMIANG HULU</b> Nona Farahdiba, Syawal Gultom .....	520 - 529
<b>PENGEMBANGAN MEDIA PEMBELAJARAN BERBASIS POWTOON PADA MATERI KEKONGRUENAN DAN KESEBANGUNAN DI KELAS IX SMP IT AD DURRAH</b> Putri Heriyani, Nurhasanah Siregar .....	530 - 537
<b>PENGARUH PEMBELAJARAN BERBASIS MASALAH DENGAN PENDEKATAN KONTEKSTUAL TERHADAP KEMAMPUAN REPRESENTASI MATEMATIS SISWA</b> Siti Marwa Hernawan, Pardomuan Sitompul.....	538 - 546
<b>IMPLEMENTASI MODEL PEMBELAJARAN BERBASIS MASALAH UNTUK MENINGKATKAN KOMUNIKASI MATEMATIKA DILIHAT DARI PARTISIPASI SISWA PADA PEMBELAJARAN MATEMATIKA</b> Widya Ramadhani, Syawal Gultom .....	547 - 555
<b>PENGEMBANGAN MEDIA PEMBELAJARAN MATEMATIKA INTERAKTIF APLIKASI ANDROID BERBASIS RME MELALUI PENDEKATAN <i>BLENDED LEARNING</i></b> Cristin Natalia Napitupulu, Edi Syahputra.....	556 - 563



<b>PENGEMBANGAN PERANGKAT PEMBELAJARAN BERBASIS REALISTIC MATHEMATICS EDUCATION UNTUK MENINGKATKAN KEMAMPUAN VISUAL SISWA SMP</b>	
Oktalena Zai, Edi Syahputra .....	564 - 569
<b>PENGEMBANGAN MEDIA PEMBELAJARAN QUIZ MATEMATIKA INTERAKTIF BERBASIS WEB UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH SISWA KELAS XI SMA NEGERI 9 MEDAN</b>	
Aris Saputra Pardede, Muliawan Firdaus.....	570 - 576
<b>PENERAPAN MODEL CONTEXTUAL TEACHING AND LEARNING BERBANTUAN E-LKPD DALAM MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS SISWA KELAS VIII SMPN 24 MEDAN</b>	
Teddy Soemantry Sianturi, Muliawan Firdaus.....	577 - 587
<b>PENGEMBANGAN BAHAN AJAR MATEMATIKA MELALUI PEMBELAJARAN MATEMATIKA REALISTIK BERBANTUAN SOFTWARE GEOGEBRA UNTUK MENINGKATKAN KEMAMPUAN SPASIAL SISWA SMPN 35 MEDAN</b>	
Tri Ambarwati Nurul Putri, Muhammad KMS Amin Fauzi .....	588 - 594
<b>PENGEMBANGAN LEMBAR KERJA PESERTA DIDIK (LKPD) BERBASIS <i>PROBLEM SOLVING</i> UNTUK MENINGKATKAN PEMECAHAN MASALAH MATEMATIS SISWA SMA KELAS X</b>	
Aida Hafni Rambe, Pargaulan Siagian.....	595 - 603
<b>PENGEMBANGAN LKPD BERBASIS PMR UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS PADA SISWA KELAS XI SMA NEGERI 14 MEDAN</b>	
Sartika Rismaya Manihuruk, Pargaulan Siagian.....	604 - 610
<b>PENGEMBANGAN BUKU DIGITAL BERBASIS PMR UNTUK MENINGKATKAN KEMAMPUAN LITERASI NUMERASI DAN SELF-EFFICACY SISWA KELAS VIII SMP</b>	
Nina Novsyiah Sihombing, Kms Muhammad Amin Fauzi.....	611 - 620
<b>UPAYA MENINGKATKAN KEMAMPUAN PEMAHAMAN KONSEP MATEMATIKA SISWA MELALUI PENERAPAN MODEL PEMBELAJARAN PROBLEM BASED LEARNING BERBANTUAN VIDEO PEMBELAJARAN DI KELAS VII</b>	
Dilla Hafizzah, Mukhtar.....	621 - 629
<b>THE EFFECT OF PROBLEM-BASED LEARNING MODEL ASSISTED BY GEOGEBRA SOFTWARE ON STUDENTS' MATHEMATICAL COMMUNICATION ABILITYIN SMP N 1 SELESAI</b>	
Dwi Antika Br Nasution, E. Elvis Napitupulu .....	630 - 637
<b>ANALISIS KEMAMPUAN BERPIKIR KREATIF MATEMATIS SISWA SETELAH DIBELAJARKAN DENGAN MODEL PEMBELAJARAN PROBLEM BASED LEARNING</b>	
Adrianus Juan Felix Butar Butar, Syawal Gultom.....	638 - 646
<b>HUBUNGAN KEMANDIRIAN DAN MINAT BELAJAR TERHADAP KEMAMPUAN PENALARAN MATEMATIS SISWA DENGAN MODEL PROBLEM BASED LEARNING DI SMP NEGERI 29 MEDAN</b>	
Lulu Madame Silalahi, Dian Armanto .....	647 - 656

**ANALISIS KESALAHAN SISWA DALAM PENYELESAIAN MASALAH MATEMATIS MELALUI MODEL PBL DI SMP**

Maxwell Ompusunggu ..... 657 - 663

**PENGEMBANGAN LKPD BERBASIS PJBL-STEM UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF MATEMATIS PADA SISWA SMA NEGERI 1 DELI TUA**

Dinda Riski Aulia, Asrin Lubis ..... 664 - 673

**THE APPLICATION OF PROBLEM BASED LEARNING BY USING LIVE WORKSHEET WEBSITE TO IMPROVE PROBLEM SOLVING SKILL IN LEARNING QUADRATIC EQUATION IN CLASS IX STUDENTS OF SMPN 1 GALANG**

Erwin Syahputra, Waminton Rajagukguk ..... 674 - 682

**PENGEMBANGAN BAHAN AJAR BERBASIS CASE METHOD BERBANTUAN ANDROID UNTUK MENINGKATKAN KEMAMPUAN PEMAHAMAN MATEMATIS SISWA KELAS X SMA**

Hidayah Tia Azriani Nasution, Tiur Malasari ..... 683 - 692

**PENGEMBANGAN MEDIA PEMBELAJARAN DIGITAL BERBASIS ETNOMATEMATIK BATAK DENGAN MODEL PBL UNTUK MENINGKATKAN KEMAMPUAN LITERASI MATEMATIS SISWA SMPN 3 KISARAN**

Putri Ardhanita Harahap, Muhammad KMS Amin Fauzi ..... 693 - 701

**PENGARUH MODEL PEMBELAJARAN KOOPERATIF TIPE *TWO STAY TWO STRAY* TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA DI SMA NEGERI 7 MEDAN**

Sarah Maulida Siahaan, Asmin ..... 702 - 710

**PENERAPAN MODEL PEMBELAJARAN SEARCH, SOLVE, CREATE, AND SHARE UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF MATEMATIS SISWA KELAS X DI SMA NEGERI 1 DELI TUA**

Mia Rizki Idaroyanni Siregar, Dian Armanto ..... 711 - 718

**PENGARUH MODEL PEMBELAJARAN PBL TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA KELAS X SMA NEGERI 2 PANGURURAN**

Arie O. Situngkir ..... 719 - 727

**PENERAPAN MODEL PEMBELAJARAN *DISCOVERY LEARNING* BERBANTUAN APLIKASI GEOGEBRA UNTUK MENINGKATKAN PENALARAN MATEMATIS SISWA KELAS VIII SMP**

Robby Rahmatullah, Izwita Dewi ..... 728 - 737

**PENGEMBANGAN BAHAN AJAR MATEMATIKA BERBENTUK VIDEO PEMBELAJARAN ANIMASI BERBASIS *PROBLEM BASED LEARNING* UNTUK MENINGKATKAN KEMAMPUAN KOMUNIKASI MATEMATIKA SISWA SMA KELAS X**

Mayana Angelita Tambunan, Nurliani Manurung ..... 738 - 746

**EFEKTIVITAS PEMBELAJARAN DARING MENGGUNAKAN MEDIA ONLINE SELAMA PANDEMI COVID – 19 (STUDY KASUS BELAJAR MATA PELAJARAN MATEMATIKA KELAS VIII SMPN 35 MEDAN)**

Ulinskyah, Syawal Gultom ..... 747 - 752

<b>PENGEMBANGAN E-MODUL BERBASIS STEAM UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VII</b> Anita Khofifah Ray, Kms Muhammad Amin Fauzi.....	753 - 759
<b>DIFFERENCES IN STUDENTS' MATHEMATICAL COMMUNICATION ABILITY USING RME APPROACH AND PROBLEM POSING APPROACH AT SMP NEGERI 1 BANDAR</b> Pittauli Ambarita, Hasratuddin .....	760 - 765
<b>ANALISIS KEMAMPUAN PEMAHAMAN KONSEP MATEMATIS DALAM MEMECAHKAN MASALAH DENGAN PENDEKATAN OPEN ENDED DITINJAU DARI KECENDERUNGAN GAYA BELAJAR SISWA SMP NEGERI 16 MEDAN</b> Nadya Isti Amima Siagian, Waminton Rajagukguk.....	766 - 774
<b>PENGARUH PENDEKATAN MATEMATIKA REALISTIK BERBANTUAN <i>WOLFRAM ALPHA</i> TERHADAP KEMAMPUAN PEMAHAMAN KONSEP MATEMATIS SISWA KELAS VIII SMP MUHAMMADIYAH 3 MEDAN .....</b> Majdah Luthfita, Denny Haris .....	775 - 783
<b>PENGARUH MODEL PEMBELAJARAN KOOPERATIF <i>TIPE THINK PAIR SHARE</i> TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA SMP</b> Evi Yanti P Siregar, Nurhasanah Siregar.....	784 - 792
<b>THE EFFECT OF THINK PAIR SHARE LEARNING MODEL ASSISTED BY WINGEOM SOFTWARE ON STUDENT'S MATHEMATICAL COMMUNICATION ABILITY IN SMP NEGERI 35 MEDAN</b> Dinda Apriani Hia, Pardomuan N.J.M Sinambela .....	793 - 801
<b>PENERAPAN MODEL PEMBELAJARAN <i>DISCOVERY LEARNING</i> UNTUK MENINGKATKAN PEMAHAMAN KONSEP MATEMATIKA</b> Tharisyia Annida Radani, E. Elvis Napitupulu .....	802 - 810
<b>PENGEMBANGAN BAHAN AJAR DENGAN PENDEKATAN MATEMATIKA REALISTIK BERBASIS ETNOMATEMATIKA PADA SONGKET MELAYU DELI UNTUK MENINGKATKAN HASIL BELAJAR MATEMATIKA SISWA</b> Alneta Angelia Br Brahmana, Fevi Rahmawati Suwanto .....	811 - 819
<b>UPAYA MENINGKATKAN KEMAMPUAN KOMUNIKASI MATEMATIS SISWA MELALUI MODEL <i>PROBLEM BASED LEARNING</i> DI KELAS VIII SMP YPMA MEDAN</b> Irma Dwi Suryani, Mukhtar .....	820 - 828
<b>UPAYA MENINGKATKAN PEMAHAMAN KONSEP MATEMATIKA DENGAN MODEL PEMBELAJARAN <i>CONCEPTUAL UNDERSTANDING PROCEDURES</i> BERBANTUAN E-MODUL DI KELAS XI IPA SMAN 11 MEDAN</b> Indah Veronika Susanti Tarigan, Mukhtar.....	829 - 839
<b>PENERAPAN MODEL <i>PEMBELAJARAN SEARCH, SOLVE, CREATE, AND SHARE</i> UNTUK MENINGKATKAN KEMAMPUAN PEMAHAMAN KONSEP PADA SISWA</b> Mhd. Ricky Murtadha, Sri Wahyuni, Aica Wira Islami .....	840 - 848
<b>PENGEMBANGAN E-MODUL PEMBELAJARAN MATEMATIKA BERBASIS PENDEKATAN <i>REALISTIC MATHEMATICS EDUCATION</i> DALAM PEMAHAMAN KONSEP MATERI PELUANG</b> Tri Ananda Girsang, Edy Surya .....	849 - 853

<b>PENGARUH MODEL PEMBELAJARAN <i>MISSOURI MATHEMATICS PROJECT</i> TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIKA PADA SISWA</b> Dhiena Safitri, Fathul Jannah, Nur Imaniyanti .....	854 - 861
<b>PENINGKATAN AKTIVITAS DAN HASIL BELAJAR MATEMATIKA MATERI KOMBINATORIK MELALUI PEMBELAJARAN KOOPERATIF BERBANTUAN KOMPUTER</b> Fathur Rahmi.....	862 - 873
<b>PENERAPAN MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> BERBANTUAN GEOGEBRA UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH SISWA KELAS VIII SMP NEGERI 6 MEDAN</b> Bintang Tabita Sianipar, Marojahan Panjaitan .....	874 - 880
<b>PENGEMBANGAN MEDIA INTERAKTIF PADA PEMBELAJARAN MATEMATIKA BERBANTUAN GEOGEBRA DENGAN PENDEKATAN STEM UNTUK MENINGKATKAN PEMAHAMAN KONSEP MATEMATIS SISWA SMP NEGERI 1 BINJAI LANGKAT</b> Nurul Fidiah, Kms. M. Amin Fauzi .....	881 - 890
<b>PENGARUH PENGGUNAAN MEDIA PEMBELAJARAN <i>ARTICULATE STORYLINE 3</i> TERHADAP KEMAMPUAN REPRESENTASI MATEMATIS SISWA SMP</b> Santi Karla Silalahi, Mangaratua M. Simanjorang .....	891 - 899
<b>PENGEMBANGAN E-LKPD DENGAN MENGGUNAKAN WIZER.ME BERBASIS <i>PROBLEM BASED LEARNING</i> UNTUK MENINGKATKAN PEMECAHAN MASALAH SISWA KELAS VIII SMP</b> Sesili Andriana, Marojahan Panjaitan .....	900 - 909
<b>PENGARUH DISPOSISI MATEMATIS SISWA TERHADAP KEMAMPUAN KOMUNIKASI MATEMATIS SISWA SMA NEGERI 4 KISARAN</b> Zulaifatul Husna Br Siregar, Asmin .....	910 - 918
<b>PENGEMBANGAN MEDIA PEMBELAJARAN BERBASIS <i>VIDEO EXPLAINER</i> PADA POKOK BAHASAN BARISAN DAN DERET UNTUK MENINGKATKAN MINAT BELAJAR SISWA</b> Nova Yulisa Putri, Tiur Malasari Siregar .....	919 - 927
<b>PENGARUH MODEL PEMBELAJARAN KOOPERATIF TIPE <i>MAKE A MATCH</i> DAN TIPE <i>STAD</i> TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA KELAS VIII DI MTS YASPI LABUHAN DELI</b> Ismi Salwa Thohirah, Wingston Leonard Sihombing .....	928 - 936
<b>PENGARUH MODEL PEMBELAJARAN <i>PROBLEM BASED LEARNING</i> BERBANTUAN KAHOOT TERHADAP <i>COMPUTATIONAL THINKING</i> PADA SISWA KELAS VIII SMP NEGERI 1 BINJAI</b> Naomi Camelia, Erlinawaty Simanjuntak.....	937 - 945
<b>DEVELOPMENT OF INTERACTIVE COMICS BASED ON REALISTIC MATHEMATICS APPROACH TO IMPROVE MATHEMATICAL COMMUNICATION ABILITIES OF STUDENTS OF SMPS MUSDA PERBAUNGAN</b> Fitri Aulia, Asmin.....	946 - 952

<b>Bidang Ilmu: Matematika</b> .....	953
<b>ANALISIS PENERIMAAN E-LEARNING BERDASARKAN <i>TECHNOLOGY ACCEPTANCE MODEL</i> DENGAN PENDEKATAN <i>PARTIAL LEAST SQUARE - STRUCTURAL EQUATION MODELING</i></b>	
Rizka Annisa Mingka, Hamidah Nasution .....	954 - 960
<b>IMPLEMENTASI <i>FUZZY GAME THEORY</i> DALAM MENENTUKAN STRATEGI PEMASARAN OPTIMAL (STUDI KASUS PERSAINGAN <i>E-COMMERCE</i> SHOPEE, TOKOPEDIA DAN LAZADA)</b>	
Fasya Arsita, Hamidah Nasution .....	961 - 967
<b>ANALISIS BIAYA SATUAN RAWAT INAP MENGGUNAKAN METODE <i>STEP DOWN</i> PADA RSUD DR. DJASAMEN SARAGIH PEMATANG SIANTAR</b>	
Inra Wisada Manurung, Nerli Khairani .....	968 - 972
<b>PENERAPAN METODE ASSIGNMENT HUNGARIAN DALAM MENENTUKAN PENUGASAN WAKTU KERJA PT. SINAR SOSRO</b>	
Nickie Aulia Nerti Pane, Nerli Khairani .....	973 - 979
<b>ANALISIS PREDIKSI HARGA EMAS BULANAN DI KOTA MEDAN MENGGUNAKAN METODE JARINGAN SYARAF TIRUAN ALGORITMA <i>BACKPROPAGATION</i></b>	
Meisal Habibi Perangin-angin, Chairunisah .....	980 - 987
<b>ANALISIS FAKTOR YANG MEMPENGARUHI TINGKAT KRIMINALITAS DI SUMATERA UTARA MENGGUNAKAN METODE REGRESI DATA PANEL</b>	Ika
Amelia, Faridawaty Marpaung.....	988 - 995
<b>PENERAPAN ALGORITMA A* DALAM MENENTUKAN RUTE TERPENDEK PENGAMBILAN SAMPAH DI KOTA MEDAN</b>	
Messyanti Br Simanjuntak, Faridawaty Marpaung.....	996 - 1009
<b>METODE <i>SPATIAL AUTOREGRESSIVE</i> DALAM ANALISIS KASUS DEMAM BERDARAH DENGUE DI SUMATERA UTARA</b>	
Nabila Khairunnisa, Elmanani Simamora .....	1010 - 1017
<b>PENERAPAN <i>MINIMUM SPANNING TREE</i> PADA JARINGAN PIPA DISTRIBUSI AIR PDAM TIRTA BENGI DI SIMPANG TIGA REDELONG DENGAN MENGGUNAKAN ALGORITMA FLOYD-WARSHALL</b>	
Andra Febiola Nita, Faridawaty Marpaung.....	1018 - 1024
<b>PREDIKSI JUMLAH KEMISKINAN DENGAN MENGGUNAKAN METODE JARINGAN SYARAF TIRUAN <i>BACKPROPAGATION</i></b>	
Ceria Clara Simbolon, Chairunisah.....	1025 - 1031
<b>IMPLEMENTASI METODE <i>ANT COLONY OPTIMIZATION</i> PADA PENCARIAN RUMAH SAKIT TERDEKAT BERBASIS ANDROID (STUDI KASUS: RUMAH SAKIT DI KOTA MEDAN)</b>	
Sri Utami Dewi, Dinda Kartika .....	1032 - 1037
<b>IMPLEMENTASI <i>FUZZY TIME SERIES MARKOV CHAIN</i> PADA PERAMALAN NILAI TUKAR RUPIAH TERHADAP DOLAR US</b>	
Mita Cahyati, Chairunisah.....	1038 - 1043

<b>PERBANDINGAN METODE <i>DOUBLE EXPONENTIAL SMOOTHING BROWN</i> DENGAN <i>TRIPLE EXPONENTIAL SMOOTHING BROWN</i> PADA PERAMALAN JUMLAH PENDUDUK DI KABUPATEN DELI SERDANG</b>	
Agnes Anastasia, Chairunisah .....	1044 - 1049
<b>ANALISIS KESTABILAN DARI MODEL MATEMATIKA UNTUK PENYEBARAN PENYAKIT CORONAVIRUS (COVID-19)</b>	
Wulan Larassaty, Yulita Molliq Rangkuti .....	1050 - 1054
<b>IDENTIFIKASI AUTOKORELASI SPASIAL MENGGUNAKAN <i>GEARY'S RATIO</i> PADA JUMLAH PENGANGGURAN DI SUMATERA UTARA</b>	
Hanna Gabriel Srirani Manurung, Hamidah Nasution .....	1055 - 1059
<b>PEMBANGKITAN ORNAMEN (GORGA) BATAK SIMALUNGUN MENGGUNAKAN <i>GRAPHICAL USER INTERFACE</i> MATLAB DENGAN MEMANFAATKAN GRUP <i>FRIEZE</i> DAN GRUP KRISTALOGRAFI</b>	
Marlina Sinaga, Dinda Kartika .....	1060 - 1067
<b>PENERAPAN ALGORITMA KOLONI LEBAH PADA PENJADWALAN PERAWAT DI RUMAH SAKIT UMUM PUSAT H. ADAM MALIK</b>	
Novita Karnya Situmorang, Faiz Ahyaningsih .....	1068 - 1072
<b>OPTIMALISASI WAKTU NYALA LAMPU HIJAU MENGGUNAKAN FUZZY LOGIC PADA PERSIMPANGAN JALAN SISINGAMANGARAJA-JALAN TURI KOTA MEDAN</b>	
Jimmi Parlindungan Manalu .....	1073 - 1082
<b>ANALISIS SISTEM ANTRIAN PADA TELLER BANK MANDIRI KCP MEDAN LETDA SUJONO DENGAN MENGGUNAKAN MODEL ANTRIAN <i>MULTI CHANEL SINGLE PHASE</i></b>	
Lowis Fernando Sitorus, Abil Mansyur .....	1083 - 1088
<b>IMPLEMENTASI <i>GAME THEORY</i> DAN <i>MARKOV CHAIN</i> DALAM MENENTUKAN STRATEGI PEMASARAN SERTA PERPINDAHAN PELANGGAN APLIKASI <i>STREAMING</i> MUSIK</b>	
Intan Siagian, Marlina Setia Sinaga .....	1089 - 1095
<b>OPTIMALISASI HASIL PANEN PADI BERDASARKAN KOMBINASI PUPUK MENGGUNAKAN METODE <i>FUZZY GOAL PROGRAMMING</i> (STUDI KASUS DINAS PERTANIAN KABUPATEN TAPANULI UTARA)</b>	
Ima Uli Sri Natasya Sitompul, Hamidah Nasution .....	1096 - 1106
<b>PERBANDINGAN METODE NAIVE DAN METODE <i>A-SUTTE INDICATOR</i> DALAM MERAMALKAN JUMLAH PRODUKSI PADA CPO (STUDI KASUS: PT. BINA PITRI JAYA)</b>	
Endang, Didi Febrian .....	1107 - 1116
<b>PERBANDINGAN MODEL GREY MARKOV (1,1) DAN MODEL SARIMA DALAM PERAMALAN PENJUALAN ROTI (STUDI KASUS : UD SELINA BAKERY)</b>	
Ezra Yolanda Siregar, Hanna Dewi M. Hutabarat .....	1117 - 1124
<b>BILANGAN DOMINASI SIMPUL DAN BILANGAN DOMINASI SISI PADA GRAF POT BUNGA (<math>C_m S_n</math>)</b>	
Desi Fitrahana Rambe, Mulyono .....	1125 - 1133

<b>KAJIAN METODE ZILLMER DALAM MENGHITUNG NILAI CADANGAN PREMI PADA ASURANSI JIWA SEUMUR HIDUP</b>	
Ade Sonia Putri, Sudianto Manullang.....	1134 - 1137
<b>OPTIMALISASI PENJADWALAN SHIFT KERJA PERAWAT DAN BIDAN DI RUMAH SAKIT UMUM DAERAH TAPANULI TENGAH MENGGUNAKAN ALGORITMA GENETIKA</b>	
Wardatul Ilma Pasaribu, Faridawaty Marpaung.....	1138 - 1143
<b>TRANSPOSE MODUL PROJEKTIF RELATIF TERHADAP MODUL BAGIAN TAKPROJEKTIF</b>	
Yudi Mahatma, Ibnu Hadi, Sudarwanto .....	1144 - 1146
<b>PENERAPAN GRAF KOMPATIBEL PADA PENENTUAN WAKTU TUNGGU LAMPU LALU LINTAS DI BEBERAPA PERSIMPANGAN KOTA MEDAN</b>	
Aisyah Nuri Sabrina, Mulyono .....	1147 - 1152
<b>PENERAPAN ALGORITMA BELLMAN-FORD UNTUK MENENTUKAN LINTASAN TERPENDEK DALAM PENDISTRIBUSIAN BARANG PADA PT. GLOBAL JET CARGO (J&amp;T CARGO)</b>	
Enzel Sri Ulina Br. Ketaren, Faridawaty Marpaung .....	1153 - 1163
<b>PERAMALAN <i>CRUDE PALM OIL</i> MENGGUNAKAN METODE <i>SEASONAL AUTOREGRESSIVE INTEGRATED MOVING AVERAGE</i> PADA PT. GRAHADURA LEIDONG PRIMA</b>	
Putri Novianti, Tri Andri Hutapea .....	1164 - 1168
<b>SISTEM PENDUKUNG KEPUTUSAN DALAM PEMILIHAN <i>OUTLET BUBBLE DRINK</i> TERBAIK DI KOTA MEDAN DENGAN METODE <i>SIMPLE ADDITIVE WEIGTING</i></b>	
Tenri Musdalifah, Arnah Ritonga.....	1169 - 1174
<b><i>MULTI ATTRIBUTE DECISION MAKING</i> DALAM MENENTUKAN APLIKASI BELANJA ONLINE TERBAIK DENGAN METODE <i>ANALYTICAL HIERARCHY PROCESS</i> (STUDI KASUS: MAHASISWA MATEMATIKA UNIMED 2019-2022)</b>	
Crish Evangelyn Siboro, Lasker Pangarapan Sinaga .....	1175 - 1184
<b>MODEL REGRESI <i>ROBUST</i> TINGKAT PENGANGGURAN DI INDONESIA DENGAN MEMBANDINGKAN PEMBOBOT <i>TUKEY BISQUARE</i> DAN <i>WELSCH</i></b>	
Thasya Febrianti Sitinjak, Hanna Dewi M. Hutabarat .....	1185 - 1192
<b>OPTIMASI PORTOFOLIO SAHAM PADA SUBSEKTOR PERBANKAN MENGGUNAKAN <i>CAPITAL ASSET PRICING MODEL</i></b>	
Audrey Amelia Pardede, Hamidah Nasution .....	1193 - 1198
<b><u>Bidang Ilmu : Ilmu Komputer</u> .....</b>	<b>1199</b>
<b>IMPLEMENTASI ALGORITMA <i>K-NEAREST NEIGHBOR</i> UNTUK KLASIFIKASI PENERIMA BEASISWA PROGRAM INDONESIA PINTAR (STUDI KASUS : SMAN 1 PEMATANGSIANTAR)</b>	
Edward Anggiat Maju Simanjuntak, Susiana.....	1200 - 1211
<b>IMPLEMENTASI ALGORITMA <i>NAÏVE BAYES CLASSIFIER</i> PADA KLASIFIKASI PENDUDUK MISKIN (STUDI KASUS: DESA TEMBUNG)</b>	
Gabriel Christian, Susiana.....	1212 - 1223

**DETEKSI EMOSI MANUSIA BERDASARKAN REKAMAN SUARA MENGGUNAKAN PYTHON DENGAN METODE MFCC DAN DTW-KNN**

Siti Khuzaimah, Hermawan Syahputra ..... 1224 - 1229

**PENERAPAN METODE WASPAS DALAM PENERIMA BANTUAN LANGSUNG TUNAI-DANA DESA (BLT-DANA DESA) (STUDI KASUS: DESA HUTA LIMBONG KECAMATAN PADANGSIDIMPUAN TENGGARA)**

Yolanda Feby, Arnita ..... 1230 - 1237

**PERAMALAN PERSENTASE PENDUDUK MISKIN PROVINSI SUMATERA UTARA MENGGUNAKAN METODE *LONG SHORT TERM MEMORY***

Nazifatul Fadhilah, Arnita ..... 1238 - 1245

**PEMETAAN TINGKAT PENGANGGURAN DI PROVINSI SUMATERA UTARA MENGGUNAKAN SISTEM INFORMASI GEOGRAFIS DENGAN METODE K-MEDOIDS**

Wirda Silvia Rambe, Arnita ..... 1246 - 1256





# THE APPLICATION OF PROBLEM BASED LEARNING BY USING LIVE WORKSHEET WEBSITE TO IMPROVE PROBLEM SOLVING SKILL IN LEARNING QUADRATIC EQUATION IN CLASS IX STUDENTS OF SMPN 1 GALANG

Erwin Syahputra<sup>1\*</sup>, Waminton Rajagukguk<sup>2</sup>

Department of Mathematics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Medan, Medan,  
Indonesia

\*Corresponding Author: [syahputrae76@gmail.com](mailto:syahputrae76@gmail.com)

## Abstract

*This research was conducted to improve the problem solving skills of class IX-3 students of SMPN 1 Galang in learning mathematics with the topic of quadratic equations. Learning is carried out using Live Worksheets as learning media using the Problem Based Learning (PBL) method. The object of this research is to improve problem solving skills in learning quadratic equations in student classes IX-3 SMPN 1 Galang in the academic year 2022/2023. This study used a classroom action research method that focused on Cycle I and Cycle II. In this study the instruments used were observation (students observation and teacher observation) and test (pre-test, post-test I and post-test II). Based on the data that has been analyzed, it is obtained that the students' problem solving abilities have increased from cycle I to cycle II with a gain index of 0.56 in the "Medium" category. Therefore, the researcher concludes that applying the Problem Based Learning using the Live Worksheet website can improve problem solving skills in learning quadratic equations in class ix students of SMPN 1 Galang*

**Key word:** Live Worksheet; Problem Solving Skill; Problem Based Learning; Quadratic Equation.

## 1. INTRODUCTION

Education is a process to assist humans in developing their potential and to increase human dignity so that humans can deal with any changes that occur in a better direction. Education can be pursued in various ways, and one of them is studying at school, from several subjects studied by students, mathematics is one of the essential subjects in the world of education. Mathematics will continue to be reviewed until the highest level of education.

For some materials, mathematics is presented in real-life-oriented daily problems. It aims to make mathematical material easier to understand. Students are required to be able to solve real-life-oriented math problems.

There are several factors associated with low mathematical problem solving ability.

Factors such as the classic problem of applying mathematics learning methods are still centered on the teacher, while students tend to be passive. Another classic factor is the application of conventional learning models, namely lectures, questions and answers, and giving assignments or homework (Susanto2013).

based on observations made in class IX-3 of SMP Negeri 1 Galang, it shows that conventional learning methods with lectures and question and answer activities (teacher-centered approaches) are dominantly used in learning mathematics. The problems obtained from the observations are: (1) In the learning process, students are less enthusiastic about receiving mathematics lessons. (2) Student learning activities tend to be passive. This condition causes students to be less interested in learning. (3) The teacher does not give real-live (daily) problems to solve. (4) Learning interactions between students, students and teachers are not going well. (5) Conventional learning methods/ lectures dominate. (6) The teacher does not apply effective learning strategies in the learning process.

The following results were obtained based on interviews with the Mathematics teacher of class IX-3 SMP Negeri 1 Galang: (1) The obstacle experienced by the teacher lies in the students. Students tend to be less active in asking and answering during the learning process. (2) Teachers use lectures, questions and answers, discussions, and assignments in learning. (3) Most students still find it difficult to understand the subject matter, primarily material that is not easy to learn. (4) The ability of students to solve real-live (daily) problems is still in low category because students find it difficult to interpret story questions such as which statements and which questions are in the question. (5) In addition, online learning also impacts the decline in students abilities from various aspects, such as problem solving skills and concept understanding abilities.

Based on the results of observations, interviews, and the results of diagnostic tests conducted in class IX-3 of SMP Negeri 1 Galang, it can be seen that the results

obtained by students are still low. This is in line with the results of a Trends in International Mathematics and Science Study (TIMSS) survey and the Program for International Student Assessment (PISA) that the problem solving skill Indonesian students are still bellow avarage.

Prior to this research, there have been several studies or writings that have been carried out by several researchers who use research related to the application of Problem Based Learning models to improve students' problem solving abilities.

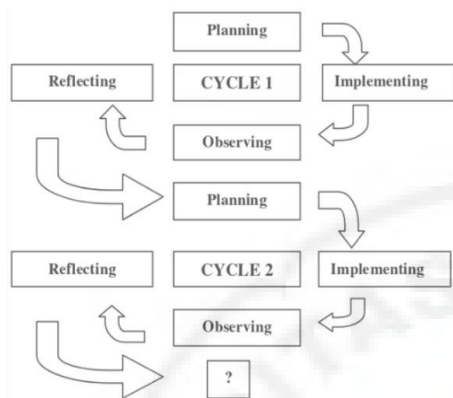
Oktafianto (2018) in his research entitled "Improving Mathematical Problem Solving Ability Through Application of Problem Based Learning Learning Model Assisted by Realia Media in Grade IV Elementary Students" concluded that in the initial conditions the value of mathematical problem solving skills was 39% and the remaining 61% of students do not have mathematical problem solving skills. Then after the implementation of the first cycle of action by applying the Problem Based Learning model, students' mathematical problem solving skills increased to 65% while those who did not have problem solving skills were 35%. Teacher activity in the first cycle is 80% and student activity is 75%. Then after the implementation of the learning action in the second cycle, students' mathematical problem solving skills increased to 91%, while those who did not have problem solving skills only increased to 9%. Teacher activity in cycle II reached 100% and student activity was 100%. Through the application of the Problem Based Learning learning model assisted by realia media in learning Mathematics, it is possible to improve math problem solving skills in class IV semester 1 SDN Sidorejo Kidul 02 in the 2018/2019 academic year.

The main purpose of this research is to find out the level of students' mathematical problem solving abilities after applying the Problem Based Learning learning model using the Live Worksheet website in class I X-3 SMPN 1 Galang.

## 2. RESEARCH METHODOLOGY

This research will be conducted in class IX-3 semester I SMPN 1 Galang, Jl Petumbukan Km 14.5 Jaharun A, kec. Galang, Kab. Deli Serdang, Prov. Sumatra Utara, Indonesia. The research will be carried out in the even semester of the 2022/2023 academic year. The timing of the research refers to the school's academic calendar.

In simple terms, the research steps can be seen in the following figure:



**Figure 1.** Steps of Classroom Action Research (Mahmud, 2008)

In the beginning of the learning the researcher give the Pre-test to get a data about students skills before learning with live worksheets. And to measure the learning outcomes the researcher use Post-test to determine the learning difficulties experienced by students. The learning outcome test consists of questions containing the Quadratic Equation material. From the test of student learning outcomes, it is known that student learning outcomes before and after the Problem Based Learning model is applied using the Live Worksheets website.

Observations made by the mathematics teacher Class IX-3 SMPN 1 Galang were observations of all activities during the learning process carried out by researchers. With the help of the subject teacher as an observer guided by the prepared observation sheet. Student observations were carried out by researchers and subject teachers to see the activeness of students in participating in learning. The results of these observations were finally submitted to the researchers for analysis.

The documentation used in this classroom action research is in the form of photo documentation. Data collection with photo documents is used to obtain a visual picture of the learning being carried out. The use of documentation is based on the consideration that a research requires tangible evidence other than quantitative data, so that this research becomes an accurate research.

### 3. RESULT AND DISCUSSION

#### 1. Implementation and Research' Result of Cycle II

In this study, researchers also made observations of students in the learning process. In addition to observations on student's activities, there are also observations on teacher's skill. The two observation activities will be carried out by the Mathematics teacher at SMPN 1 Galang class IX-3. The results of observations in cycle one can be seen in the table below:

**Table 1.** The Result of Student's Observation in Cycle-I

No	Students Activity	Level of Students Activity	
		First Meeting	Second Meeting
1	Occupying a predetermined place. Prepare notebooks and textbooks.	3	3
2	Prepare notebooks and textbooks.	3	3
3	Follow closely everything that is being doing in the class.	2	2
4	Students listen to questions or issues related to Lesson.	2	3
5	Be critical in listening Questions or answer questions asked by the teacher.	1	2
6	Pay attention earnestly and take notes.	1	2
7	Have active discussions with the group	2	2
8	Students share and cooperate with their groups.	2	2
9	Be active in asking questions in order to understand the lesson	2	2
10	Express opinions about the lesson based on the results of the discussion.	2	2
Total Score		20	23
Percentage		53.75%	

After seeing the results of the observations made by the Mathematics teacher at SMPN 1 Galang during the learning process, we can categorize it as Enough. At the first meeting the score obtained was 22 out of 40 and for the second meeting the score obtained was 27 out of 40. Meanwhile, after we combine meeting one and meeting two, we get that the level of student activity is 53.75%. The current level of student activity must be increased in the next cycle.

**Table 2.** The Result of Teacher's Observation In-Cycle I

No	Aspect	Level of Teacher Ability	
		First Meeting	Second Meeting
1	Deliver learning objectives	2	3
2	Guide students to prepare tools and materials for the teaching and learning	3	3

3	Motivate students to follow lessons	2	3
4	Present preliminary information about the material.	2	3
5	Ask all students to pay attention to what the teacher will say	3	3
6	The teacher gives the students a problem	3	3
7	Help students to understand the given problem	2	3
8	Divide students into groups to make it easier for students to discuss after understanding the problem	2	3
9	Guide students to solve problems	2	2
10	After the students get the solution to the problem, the teacher asks the students to present their solution	3	3
11	Evaluation of the learning process and final evaluation	3	3
12	The teacher guides the students to conclude the Learning	2	2
13	Assign homework	2	3
14	Enthusiastic teachers	2	3
15	Time according to allocation	3	3
16	Learning activities in accordance with Lesson Plan	3	3
Total Score		39	46
Percentage		66,4%	

After seeing the results of the observations made by the Mathematics teacher at SMPN 1 Galang when the learning process was taking place, especially on the teacher's ability to teach, we can categorize it as Enough. At the first meeting the score obtained was 39 out of 64 and for the second meeting the score obtained was 46 out of 64. Meanwhile, after we combine meeting one and meeting two, we find that the teacher's ability level is 66.4%. The current level of teacher ability must be increased in the next cycle.

After the researcher had implemented the planned Live Worksheet-based learning in cycle I. This learning was followed by 29 students of class XI-3

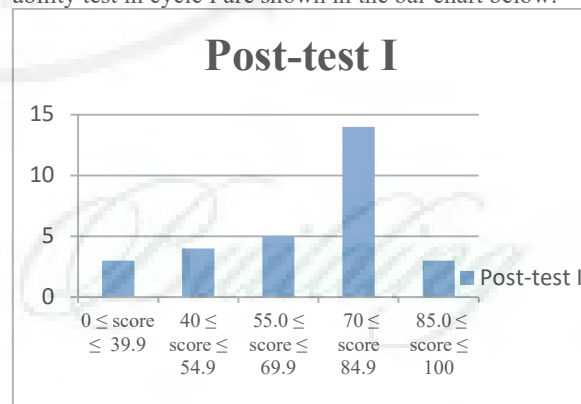
SMPN 1 Galang and after the lesson ended the researcher gave a test to students to measure the level of students' problem solving abilities. Based on the results of the tests that have been carried out, the results of the tests can be seen in the following table:

**Table 3.** Post-Test Cycle I Result

No	Score Interval	Category	Sum of Student	Perc.
1	$85 \leq S \leq 100$	Very good	3	10,3%
2	$70 \leq S \leq 84.9$	Good	14	48,5%
3	$55 \leq S \leq 69.9$	Enough	5	17,2%
4	$40 \leq S \leq 54.9$	Not enough	4	13,7%
5	$0 \leq S \leq 39.9$	Very less	3	10,3%
Total			29	100%

Based on the results of the post-test that was carried out on 29 students, it was obtained; 1) 3 out of 29 students (10.34%) have very good ability in problem solving so that they can be categorized as "Very good"; 2) 14 out of 29 students (48.27%) have good ability in problem solving so that they can be categorized as "Good"; 3) 5 out of 29 students (17.24%) have problem solving skills that are classified as standard so that they can be categorized as "Enough"; 4) 4 out of 29 students (13.79%) did not have sufficient problem solving abilities so that they could be categorized as "Not Enough", 5) and 3 out of 29 students (10.34%) did not have sufficient problem solving skills so they could be categorized as "Very Less".

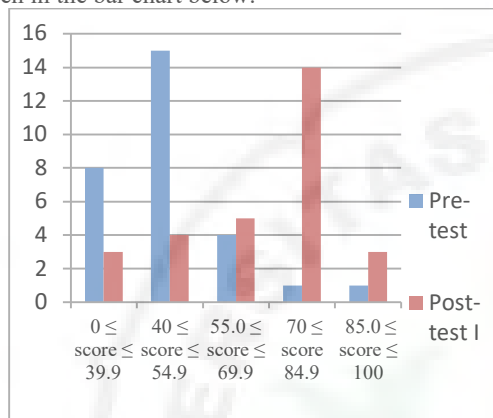
The results of the student problem-solving ability test in cycle I are shown in the bar chart below:



**Figure 2.** The Result of Post-Test I

Based on the data that has been obtained there are only 17 students who pass and the rest are still under the desired criteria. Research success indicators in this study were 85% of classical learning mastery but in this cycle the obtained classical learning mastery was still 58.61%. This shows that this research must be continued in cycle II.

Reflection in cycle I was carried out after the learning was carried out and the test results were given a value. The scores obtained by students in the pre-test experienced developments in the post-test, this can be seen in the bar chart below:



**Figure 3.** The Comparison of Pre-Test and Post-Test I Result

Based on the data above, it can be seen that progress is good, although not significant. However, this has not been able to meet the indicators of research success which must be at least 85% of students must pass the post-test. Furthermore, based on the results of observations of students obtained several obstacles. The following are the main obstacles that cause student learning outcomes to be less than optimal, namely:

Students are still unable to be conducive during the learning process which causes learning to be carried out less effectively.

1. There are still many students who don't want to ask about what they don't understand about the material being taught.
2. During the discussion session, many students were less critical and only a few students were active
3. Many students do not understand the problems explained at the beginning of the lesson. This problem orientation stage should be the most important thing to master so that it is easy to follow the lesson
4. While working on the worksheets given, there are still many students who answer carelessly and don't want to ask the teacher or discuss with friends.
5. Many students were not active in discussing activities and expressing their opinions.
6. The results of their problem-solving ability test are still not good and still need to be improved.

## 2. Implementation and Research' Result of Cycle II

After studying in cycle I and the results obtained did not meet the indicators of research success. The results obtained both from the results of the problem-solving ability test and the results from observations made on students and teachers only found several deficiencies. Based on this, in cycle II, several parts that were felt to be unsatisfactory had to be improved to the maximum. In cycle II, the main focus is the problem that has been identified in the reflection section in cycle I. In cycle II, there are 2 things that must be considered, namely the level of completeness of students must be  $\geq 85\%$  and also the teacher's ability to teach must be in the good category.

In cycle II this must refer to the results of reflection in the first cycle to improve some parts that are still not good. The parts that are already good should be improved as much as possible. Based on the results of problem identification in cycle I, the following are things that need to be fixed in this cycle:

1. Students are still unable to be conducive during the learning process which causes learning to be carried out less effectively.
2. There are still many students who don't want to ask about what they don't understand about the material being taught.
3. During the discussion session, many students were less critical and only a few students were active
4. Many students do not understand the problems explained at the beginning of the lesson. This problem orientation stage should be the most important thing to master so that it is easy to follow the lesson
5. While working on the worksheets given, there are still many students who answer carelessly and don't want to ask the teacher or discuss with friends.
6. Many students were not active in discussing activities and expressing their opinions.
7. The results of their problem-solving ability test are still not good and still need to be improved.

After the problem has been identified in cycle I through a problem-solving and observation test, the next step is to plan learning activities. In cycle II there must be some changes to the Learning Implementation Plan in order to optimize learning outcomes. Changes are found in the learning steps section which aims to make students more active and critical during the learning process. The steps that must be carried out in cycle II include:

1. Prepare a Learning Implementation Plan (RPP) which contains the stages of Problem Based Learning activities using Live Worksheets that have been added to maximize the learning process. Then discuss the lesson plans with the Class IX-3 math teacher at SMPN 1 Galang.
2. Prepare quadratic equation material in the form of student worksheets using the Live Worksheet

- for each student. Then discuss this with the Class IX-3 math teacher at SMPN 1 Galang.
3. Prepare a Post-test related to problem-solving abilities that will be given to students at the end of the cycle to measure the level of students' problem-solving abilities.
  4. Prepare an observation sheet that will be used as an instrument to observe the learning process.

After the plan has been well prepared, the researcher and the mathematics teacher for Class IX-3 SMPN 1 Galang play the role of teacher implementing the lesson plan (RPP) which has been given in addition so that the problems obtained in cycle I do not recur and are expected to be able to improve learning outcomes and learning processes. In learning activities the researcher acts as a teacher who manages all learning activities. This cycle will be carried out in 2 meetings where each meeting consists of 2 hours of lessons and for 1 hour of lessons is 40 minutes.

In cycle II, researchers also made observations of students in the learning process. In addition to observations made on students, there are also observations made by teachers. The two observation activities will be carried out by the Mathematics teacher at SMPN 1 Galang class IX-3. The results of observations in cycle one can be seen in the table below:

**Table 4.** The Result of Student's Observation in Cycle II

No	Students Activity	Level of Students Activity	
		First Meeting	Second Meeting
1	Occupying a predetermined place. Prepare notebooks and textbooks.	3	4
2	Prepare notebooks and textbooks.	3	4
3	Follow closely everything that is being doing in the class.	3	4
4	Students listen to questions or issues related to Lesson.	3	3
5	Be critical in listening Questions or answer questions asked by the teacher.	3	3
6	Pay attention earnestly and take notes.	3	3
7	Have active discussions with the group	2	3
8	Students share and cooperate with their groups.	3	3
9	Be active in asking questions in order to understand the lesson	3	3

10	Express opinions about the lesson based on the results of the discussion.	3	3
<b>Total Score</b>		29	33
<b>Percentage</b>		77,5%	

After seeing the results of the observations made by the Mathematics teacher at SMPN 1 Galang during the learning process, we can categorize them as Good. In the first meeting the score obtained was 29 out of 40 and for the second meeting the score obtained was 33 out of 40. Meanwhile, after we combine meeting one and meeting two, we get that the level of student activity is 77.5%.

**Table 5.** The Result of Teacher's Observation In Cycle II

No	Aspect	Level of Teacher Ability	
		First Meeting	Second Meeting
1	Deliver learning objectives	3	4
2	Guide students to prepare tools and materials for the teaching and learning process	3	4
3	Motivate students to follow lessons	3	3
4	Present preliminary information about the material.	3	3
5	Ask all students to pay attention to what the teacher will say	3	3
6	The teacher gives the students a problem	3	4
7	Help students to understand the given problem	3	4
8	Divide students into groups to make it easier for students to discuss after understanding the problem	3	3
9	Guide students to solve problems	3	3
10	After the students get the solution to the problem, the teacher asks the students to present their solution	3	4
11	Evaluation of the learning process and	3	3

12	final evaluation The teacher guides the students to conclude the Learning	3	4
13	Assign homework	3	4
14	Enthusiastic teachers	3	3
15	Time according to allocation	3	4
16	Learning activities in accordance with Lesson Plan	3	3
Total Score		48	56
Percentage		81,25%	

After seeing the results of the observations made by the Mathematics teacher at SMPN 1 Galang when the learning process was taking place, especially on the teacher's ability to teach, we can categorize it as Good. In the first meeting the score obtained was 40 out of 64 and for the second meeting the score obtained was 45 out of 64. Meanwhile, after we combine meeting one and meeting two, we get that the level of student activity is 81.25%.

After the researchers have implemented Live Worksheet-based learning that has been planned in cycle II. This lesson was attended by 29 students of class XI-3 SMPN 1 Galang and after the lesson ended the researcher gave a test to students to measure the level of students' problem solving abilities. Based on the results of the tests that have been carried out, the results of the tests can be seen in the following table:

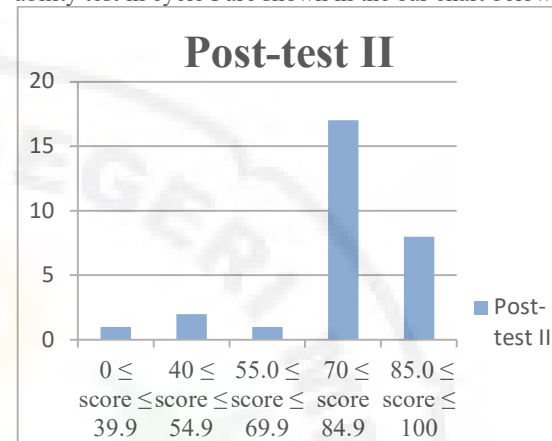
**Table 6.** Post-Test Cycle II Result

No	Score Interval	Category	Sum of Student	Perc.
1	$85 \leq S \leq 100$	Very good	8	27,5%
2	$70 \leq S \leq 84.9$	Good	17	58,6%
3	$55 \leq S \leq 69.9$	Enough	1	3,5%
4	$40 \leq S \leq 54.9$	Not enough	2	6,8%
5	$0 \leq S \leq 39.9$	Very less	1	3,5%
Total			29	100%

Based on the results of the post-test that was carried out on 29 students, it was obtained; 1) 8 out of 29 students (27.58%) have very good ability in problem solving so that they can be categorized as "Very good"; 2) 17 out of 29 students (58.62%) have good ability in problem solving so that they can be categorized as "Good"; 3) 1 out of 29 students (3.44%) has problem solving skills that are classified as standard so that they can be categorized as "Enough"; 4) 2 out of 29 students (6.89%) did not have sufficient problem solving abilities so that they could be categorized as "Not Enough", 5) and 1 out of 29 students (3.44%) did not

have sufficient problem solving skills so they could be categorized as "Very Less".

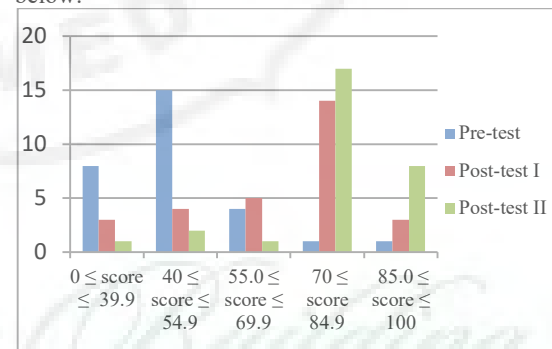
The results of the student problem-solving ability test in cycle I are shown in the bar chart below:



**Figure 4.** The Result of Post-Test II

Based on the data that has been obtained there are 25 students who pass and the rest are still under the desired criteria. Research success indicators in this study were 85% of classical learning mastery but in this cycle the obtained classical learning mastery was 86.2%. This shows that this research has met the indicators of research success.

Reflection in cycle II is carried out after learning is done and the test results have been given a value. The scores obtained by students in post-test I experienced growth in post-test II, this can be seen in the bar chart below:



**Figure 5.** The Comparison of Pre-Test, Post-Test I and Post-Test Result

Based on the data above, it can be seen that good progress has been made. In cycle II, the classical learning mastery obtained was 86.2%, which was able to meet the indicators of research success, where  $\geq 85\%$  of students had to pass the post-test. Then the teacher's ability to manage the class and in teaching is at 81.25% and can be categorized as "Good" which already meets the indicators of research success. So the 2 indicators of research success in this study have been fulfilled and can be seen more clearly in the table below:

**Table 7.** Research Success Indicator

Research Success Indicators	Percentage	Category
Classical learning mastery	86,2%	Good
Teacher's ability	81,25%	Good

### 3. Discussion

The learning was carried out by 29 students of class IX-3 SMPN 1 Galang using Live Worksheets as the main medium and also using the Problem Based Learning (PBL) learning model. Learning is carried out for the 2022/2023 school year with quadratic equation material. At the observation stage, which was carried out before the research was conducted, the researcher found that students' problem-solving abilities in working on story-based math problems were still low. By implementing learning using the Live Worksheet with the Problem Based Learning model, students' problem solving abilities can be improved. There is a very good change in students' problem solving abilities.

The initial test or pre-test of problem solving abilities given to students at the beginning of the meeting shows that students' problem solving abilities are very low. In the pre-test, only 2 students passed and 27 students did not pass with a completeness score of 70. Then after the first cycle was carried out students were given a post-test I to measure students' problem solving abilities after the application of learning using the Live Worksheet was carried out. In cycle I there was a very significant increase with 17 students passing the test and 12 students failing, with a Classical learning mastery of only 58.62% which did not meet the research indicators. Furthermore, after the second cycle was completed, 25 students passed the test and 4 students did not pass, with a Classical learning mastery of 86.2% which already fulfilled the indicators of the success of this study. More details on the pre-test and post-test value data can be seen in the following table:

**Table 8.** Comparison of the Result on Every Test

Score	Category	Pre-Test	Post-Test I	Post-Test II
$85 \leq S \leq 100$	Very Good	1	3	8
$70 \leq S \leq 84.9$	Good	1	14	17
$55 \leq S \leq 69.9$	Enough	4	5	1
$40 \leq S \leq 54.9$	Not Enough	15	4	2
$0 \leq S \leq 39.9$	Very Less	8	3	1
Total		29	29	29
Classical learning mastery		6,8 %	58,6 %	86, %

In addition to Classical learning mastery which has met the criteria, there are also indicators of teacher ability which have increased in cycle 2 and have

also met the desired criteria. More details can be seen in the following table:

**Table 9.** The Categori of Teacher's Abilities on Cycle I and Cycle II

Siklus	Percentage	Categories
I	66,4%	Enough
II	81,25%	Good

Then to find out the level of student's problem solving abilities, use the normalized gain formula (Meltzer, 2002):

$$\text{normalized gain } (g) = \frac{\text{post-test II score} - \text{pre test score}}{\text{maximum skor} - \text{pre test score}} \quad (1)$$

$$\text{normalized gain } (g) = \frac{77,5 - 44,9}{100 - 44,9} = 0,59 \quad (2)$$

The level of students' problem solving abilities after being calculated using the normalized gain formula obtained a value of 0.59 and can be categorized as "Medium"

Based on the results of the discussion of the research data that has been carried out above, the application of Problem Based Learning using the Live Worksheet website has succeeded in improving students' problem solving abilities in mathematics lessons, especially in the material of quadratic equations in class IX-3 students of SMPN 1 Galang.

### 4. CONCLUSION

After this research has been completed and the required data has been obtained and has been analyzed in the previous chapter, the can conclude that the application of Problem Based Learning using the Live Worksheet website can improve problem solving skills in researchers learning quadratic equations. More clearly explain below:

1. There was an increase in students' problem solving abilities from cycle I to cycle II. This can be seen from the Classical learning mastery in pre-test 1 only 6.89%, there was an increase in cycle I with 58.62% and in cycle II it increased to 86.2%.
2. Not only did students' problem-solving abilities increase, teachers' abilities in managing classes and teaching also increased. In cycle I the teacher's ability level was in the "Enough" category with a score of 66.4%, then in cycle II the teacher's ability level increased to "Good" with a score of 81.25%.
3. The level of student activity in the learning process also increased. In cycle I, a score of 53.75% was obtained in the "Enough" category, then it increased in cycle II with a score of 77.5% in the "Good" category.



4. The level of students' problem solving abilities after this research was conducted obtained a value of 0.59 and could be categorized as "Medium".

For future researchers who wish to conduct research with the same problems and methods, they must maximize technological advances so that the world of education is not left behind. There are many platforms that can be used as learning media but must pay attention to the suitability of the topic being discussed so that the media is successful in increasing the indicators to be achieved.

#### DAFTAR PUSTAKA

- Al Kusaeri. (2019). Pengembangan Program Pembelajaran Matematika. Mataram: Fakultas Tarbiyah dan Keguruan UIN Mataram.
- Arrahim, & Isnaini Salbia, Nur. (2021). Penerapan model problem based learning untuk meningkatkan kemampuan pemecahan masalah matematika siswa sekolah dasar pada materi FPB dan KPK. *PEDAGOGIK*, 9(1): 53-59.
- Dwi Putra, Harry, Fathia Thahiram, Nazmy, Ganiati, Mentari, & Nuryana, Dede. (2018). Kemampuan Pemecahan Masalah Matematis Siswa SMP pada Materi Bangun Ruang. *Jurnal Ilmiah Pendidikan Matematika*, 6(2): 82-90.
- Effendi, Refki, Herpratiwi, & Sutiarto, Sugeng. (2021). Pengembangan LKPD Matematika Berbasis Problem Based Learning di Sekolah Dasar. *Jurnal Basicedu*, 5(2): 920-929.
- Ernest, Paul. (2004). *The Philosophy of Mathematics Education*. France: Taylor & Francis Group.
- Fikri, Hasnul, & Sri Madona, Ade. (2018). Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif. Yogyakarta: Samudra Biru.
- Hardani, dkk. (2020). *Metode Penelitian Kualitatif & Kuantitatif*. Yogyakarta: Pustaka Ilmu Group.
- Hasan, Muhammad, dkk. (2021). *Media Pembelajaran*. Klaten: Tahta Media Group.
- Helmiati. (2012). *Model Pembelajaran*. Pekanbaru: Aswaja.
- Mahmud, & Priatna, Tedi. (2008). *Penelitian Tindakan Kelas (Teori dan Praktik)*. Bandung: Tsabita.
- Netriwati, & Sri Lena, Mai. (2017). *Media Pembelajaran Matematika*. Bandar Lampung: Permata Net.
- Oktafrianto, C Relmasira, Stefanus, & Tyas Asri Hardini Agustina. (2018). Meningkatkan Kemampuan Pemecahan Masalah Matematika Melalui Penerapan Model Pembelajaran Problem Based Learning (Pbl) Berbantuan Media Realia Pada Siswa Kelas IV SD. *Jurnal Mimbar Ilmu*, 23(3): 218-224.
- Rahman As'ari, Abdur, Tohir, Muhammad, & Valentino, Erik. (2017). *Matematika Kelas 8 SMP*. Jakarta: Kemendikbud.
- Ramli, Muhammad. (2012). *Media dan Teknologi Pembelajaran*. Banjarmasin: IAIN Antasari Press.
- ROHMAH, MUNTIANI. (2022). Penggunaan Media Google Classroom Berbantu Liveworksheets Untuk Meningkatkan Hasil Belajar Ipa Materi Kemagnetan Siswa SMP. *Jurnal Inovasi Pendidikan Berbantuan Teknologi*, 2(1): 16-26.
- Santika, dkk. (2015). Pengaruh Model Pembelajaran Berbasis Masalah Dalam Setting Pembelajaran Daring Terhadap Prestasi Belajar Matematika dan Kemampuan Pemecahan Masalah Siswa Kelas X SMA. *Jurnal Teknologi Pembelajaran Indonesia*, 10(10): 105-117.
- Siyoto, Sandu & Sodik, Ali. (2015). *Dasar Metodologi Penelitian*. Yogyakarta: Literasi Media Publishing.
- Sofyan, Herminarto. (2017). *Problem Based Learning Dalam Kurikulum 2013*. Yogyakarta: UNY Press.
- Subchan, dkk. (2018). *Matematika SMP: Buku Guru*. Jakarta: Kementerian Pendidikan dan Kebudayaan.
- Sukiman. (2012). *Pengembangan Media Pembelajaran*. Yogyakarta: Pedagogia.
- Sukino. (2014). *Matematika Jilid 1B*. Jakarta: Erlangga.
- Sukma Dewi, Putri, & Windya Septa, Hendy. (2019). Peningkatan Kemampuan Pemecahan Masalah Dan Disposisi Matematis Siswa Dengan Pembelajaran Berbasis Masalah. *Mathema Journal*, Volume 1(1): 31-39.
- Sri Sumartini, Tina. (2016). Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa melalui Pembelajaran Berbasis Masalah. *Jurnal Pendidikan Matematika STKIP Garut*, 5(2): 148-158.