6th SEA-DR IC

Book of Program

South East Asia Design Research Internasional Conference

27-28 June 2018 Hermes Palace Hotel Banda Aceh

MASTER PROGRAM OF MATHEMATICS EDUCATION
SYIAH KUALA UNIVERSITY

THE 6TH SOUTH EAST ASIA DESIGN RESEARCH (SEA-DR) INTERNATIONAL CONFERENCE ON TEACHING MATHEMATICS, SCIENCE, AND TECHNOLOGY

Theme:

Inspiring students to learn: Fostering Innovative teaching and learning of mathematics, science, and technology

Editorial Team:

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Hermes Palace Hotel, Banda Aceh, Indonesia.
June 27-28, 2018

Master Program of Mathematics Education
Faculty of Teacher Training and Education
Syiah Kuala University

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PREFACE : THE 6th SOUTH EAST ASIA DESIGN RESEARCH INTERNATIONAL CONFERENCE (SEA-DR) 2018

The advancement of today's mathematics, science and technology results in unavoidable global challenges for everyone. Students are required to be equipped with the 21 century skills to meet the challenges and play their role as an active citizen in their own country and international citizen in the so called 'borderless world'. Such skills include critical thinking, creative thinking, communication skill, and collaboration skill. Education system should thrive to assist students to excel in the 21 century skills through the innovation in teaching and learning of mathematics science and technology. The teaching and learning processes should enable students to engage in various subjects and be inspired to further and advance learning in many areas across disciplines.

This issue demands more effort in research and publications especially Designal research in various fields including mathematics, science and technology. Therefore, South East Asia Design Research (SEA-DR) as a forum of communication design Designal research in collaboration with the Department of Magister of Mathematics Education FKIP Syiah Kuala University addressing this issue by organizing the sixth international conference with the major theme "Inspiring students to learn: Fostering Innovative teaching and learning of science, mathematics and technology".

CONFERENCE CHAIR'S WELCOMING SPEECH

Assalamualaikum Wr Wb…

Good Morning everyone…

On behalf of the conference committee, I would like to welcome all the keynote speakers, distinguished guests, presenters, participants, respected colleagues, ladies and gentlemen to the 6th South East Asia Development Research International Conference (SEA-DR IC) 2018.

A very warm welcome for our keynote speakers, Prof. Berinderjeet Kaur, Prof. Maarten Dolk, Prof Dr Lilia Halim and Dr. John Willison as well as invited speakers, presenters and participants who travel across the cities, provinces or countries to be here today. Welcome to Banda Aceh.

We are specially thankful for the rector of Syiah Kuala university, Prof Dr Ir Samsul Rizal, M.Eng, the dean of the teacher training and education faculty, Prof Dr Djufri, M.Si and the head of mathematics education department, Dr Muhammad Ikhsan, to be here today, despite their busy schedule.

Last year on the 5th SEA-DR IC, it was decided that the 6th SEA-DR IC to be held in UNSYIAH. It is a great honor for us to be given this opportunity. We would like to thank the steering committee for putting your trust in our university to maintain or even improve the high standards of this conference as demonstrated over the last five years.

We have conducted a thorough review for each paper submitted and 148 papers and 33 posters have been selected to be presented in the conference. We also proud to announce that this year, selected papers will be submitted to the publisher indexed by Scopus. This publication will greatly benefit the authors and the conference for reaching global audiences.

There are seven countries participating in this conference, including: Singapore, the Netherlands, Denmark, Australia, Malaysia, Brunei Darussalam, and Indonesia.

This conference will be an excellent opportunity for academics, researchers, teachers and students to share knowledge, experiences and research findings as well as to inspire the best practice of development research in the field of teaching mathematics, science, and technology.

Finally, we would like to extend our gratitude for everyone involved for their contributions in the conference.

Once again, welcome to the 6th SEA-DR IC, I wish you a great conference experience and a pleasant stay in Banda Aceh.

Banda Aceh, 27th June 2018

Dr Rahmah Johar

RECTOR'S WELCOMING SPEECH

Assalamualaikum Wr Wb…

Good Morning….

Praises are only for Allah, the almighty, for the wonderful opportunity for us today.

On behalf of the Syiah Kuala University, it is an honor for us to welcome everyone to our university in the event of the 6th South East Asia Development Research International Conference (SEA-DR IC) 2018.

We would also like to extend our welcome to the keynote speakers, Prof. Berinderjeet Kaur, Prof. Maarten Dolk, Prof Dr Lilia Halim and Dr. John Willison. We are also pleased to welcome the invited speakers, presenters and participants as well as respected colleagues.

Our appreciation are for the dean of the teacher training and education faculty, Prof Dr Djufri, M.Si, the head of mathematics education department, Dr Muhammad Ikhsan for their supports, and the chair of the 6th SEA-DR IC 2018, Dr Rahmah Johar, M.Pd.

The 6th SEA-DR IC 2018 theme is "Inspiring students to learn: Fostering Innovative teaching and learning of science, mathematics and technology". It is no doubt that the development of science, mathematics and technology lead to more challenges for our students, and therefore, we, as educators, specifically, those in the teacher training and education field must strive to inspire students to develop their skills to meet today's challenges and demands. I believe that the keynote and invited speakers sessions and the parallel presentations will results in fruitful discussions and knowledge-sharing which in turn can promote the best practice of development research for benefiting the teaching and learning of science, mathematics, and technology.

We would also like to express our deepest gratitude to the organizing committee, whom we are extremely proud of, for their tremendous efforts in organizing this wonderful conference. They have not only managed work collaboratively across departments in their faculty but also brought together supports from several universities and organizations, including Utrecht University, Sriwijaya University, Universitas Negeri Surabaya, Universitas Negeri Padang, Lambung Mangkurat University, and Mathematics Education Research Group of Australasia (MERGA). Such collaborative culture is greatly appreciated and acknowledged.

Finally, allow me to once again welcome you to our university, we wish you a fruitful conference and wonderful stay in our city, the city of Banda Aceh.

Wassalamualaikum Wr.Wb.

Banda Aceh, 27th June 2018

Prof. Dr. Samsul Rizal, M.Eng

THE COMMITTEE OF 6TH SEA-DR INTERNATIONAL CONFERENCE

27th - 28th JUNE 2018

Steering Committee

Prof. Dr. Ir. Samsul Rizal, M. Eng (Rector of Syiah Kuala University)
Prof. Dr. Djufri, M. Si (Dean of FKIP Syiah Kuala University)
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Dr. M. Ikhsan, M. Pd (Head of Mathematics Education Department of Syiah Kuala Univesity)

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Veronika Fitri Rianasari, M. Sc
Meliasari., M. Sc
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Destina Wahyu Winarti, M. Sc
Fridgo Tasman, M. Sc
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		Dr. A. Halim,M. Si
		Dr. Ibnu Khaldun, M. Si
		Dr. M. Duskri, M. Kes

CONFERENCE PROGRAM

June 27th-28th, 2018

Place : Hermes Palace Hotel, Banda Aceh

Wednesday, June 27th 2018	
Activities	Time
Registration	08.00 - 08.45
Introduction of Mathematics Education Department	08.45 - 09.00
Conference opening	09.00 – 09.50
Coffee Break	09.50 – 10.15
Plenary Session 1: Prof. Berinderjeet Kaur (Moderator: Dr. Wanty Widjaja)	10.15 – 11.15
Plenary Session 2: Prof. Lilia Halim (Moderator: Dr. Mailizar)	11.15 – 12.15
Presentation of IMPoME (Prof. Maarten Dolk)	12.15 – 12.30
Poster Presentation	12.30 – 13.00
Lunch Break	12.45 - 14.00
Parallel Session 1	14.00 – 16.00
Coffee Break	16.00 - 16.30
Parallel Session 2	16.30 - 18.00
• Gala Dinner • Alumni Gathering (Ikatan Alumni S3 Pendidikan Matematika Universitas Negeri Surabaya)	20.00-21.00 21.00-21.30
Thursday, June 28th 2018	
Activities	Time
Invited Speaker Session & Parallel Session 3	08.30 – 10.00
Coffee Break	10.00 - 10.30
Plenary Session 3: Prof. Maarten Dolk (Moderator: Prof. Dr. Ahmad Fauzan)	10.30 - 11.30
Plenary Session 4: Dr. John Willison (Moderator: Dr. Elizar)	11.30 - 12.30

Lunch Break	12.30 - 14.00
Workshop for International Publication • Parallel workshop 1 (Prof. Dr. Zulkardi) • Parallel workshop 2 (Dr. Abdul Halim Abdullah)	14.00 - 15.30
Coffee Break	15.30 – 16.00
Workshop/Coaching Clinic on IOP publication, Journal of Physics • Parallel workshop 1 (Dr. Rully Charitas Indra Prahmana)* • Parallel workshop 2 (Prof. Dr. Marwan)*	16.00 - 17.45
Closing Ceremony	17.45 – 18.00
City Tour to Baiturrahman Mosque	18.00 - 19.00
Meeting of PMRI and steering committe of SEADR	20.00 - 21.30

Note

***Everyone whose papers will be potentially published by IOP must attend the workshop**

PARALLEL SESSION

Date : Wednesday, June 27, 2018
Time : 14:00 - 16.00

Parallel Session 1, Room 1

Time	Author(s)	ID
14.00 - 14.15	I Risdiyanti, I A Nugroho, Rully Charitas Indra Prahmana	[930]
14.15 - 14.30	Fitriati and R Novita	[943]
14.30 - 14.45	C F Yani, Z Daim, and A Murni	[955]
14.45 - 15.00	F Sanjaya, A Y Anggoro, H Julie, and M A Rudhito	[1025]
15.00 - 15.15	D N B Pg Badaruddin, K A Tengah and R C I Prahmana	[931]
15.15 - 15.30	D Fitri, R Johar, A Ahmad	[977]
15.30 - 15.45	B R A Febrilia and D W Winarti	[1084]
15.45 - 16.00	U Husna, C M Zubainur, B I Ansari	[1106]

Parallel Session 1, Room 2

Time	Author(s)	ID
14.00 - 14.15	Demitra and D Sulisworo	[950]
14.15 - 14.30	Hobri, J Safitri, S Romlah, E Nazareth, Susanto	[953]
14.30 - 14.45	R D Anggraini, A Murni, and Sakur	[957]
14.45 - 15.00	R M Bambang, Salasi R, M Hasbi, and Mardhiah MZ	[966]
15.00 - 15.15	A Minarni & E Napitupulu	[969]
15.15 - 15.30	Fajriah & T Herman	[978]
15.30 - 15.45	R Johar, M Ridha, Marwan, and Mailizar	[1066]
15.45 - 16.00	A Sanjaya, R Johar, and M Ikhsan	[1104]

Parallel Session 1, Room 3

Time	Author(s)	ID
14.00 - 14.15	K Umam & S Maulina	[971]
14.15 - 14.30	K N S Effendi, Zulkardi, R I I Putri, and P Yaniawati	[974]
14.30 - 14.45	M T Bakar, D Suryadi, Darhim, W S Tonra, and M S Noto	[993]
14.45 - 15.00	W Widada, D Herawaty, A Naashir, M T Lubis	[995]
15.00 - 15.15	M T Budiarto	[996]
15.15 - 15.30	S Seragih & Z Daim	[1009]
15.30 - 15.45	E Gee, A Fauzan, and Atmazaki	[1070]
15.45 - 16.00	H Arianti, C M Zubainur, and Hizir	[1085]

Parallel Session 1, Room 4

Time	Author(s)	ID
14.00 - 14.15	Yunita, Wahidin, and A Tsurayya	[1018]
14.15 - 14.30	R Johar, Agussalim, M Ikhsan & B Zaura	[1019]
14.30 - 14.45	B I Ansari, Saminan, and R Sulastri	[1026]
14.45 - 15.00	R Elindra	[1029]
15.00 - 15.15	H Sofyan, Jumila, and L Rahayu	[1031]
15.15 - 15.30	M Zainil, Y Helsa, Y Zainil, W and T Yanti	[1308]
15.30 - 15.45	D Arfiza, C M Zubainur, and A Veloo	[1071]
15.45 - 16.00	Irawaty, C M Zubainur, and R M Ali	[1086]

Parallel Session 1, Room 5

Time	Author(s)	ID
14.00 - 14.15	M Faradila, M Hasan, and Sulastri	[1021]
14.15 - 14.30	A Hamid & Nofisa	[1034]
14.30 - 14.45	A Halim, Yusrizal, H Mazlina, Melvina, Zainaton	[1038]
14.45 - 15.00	A Ardi, L Lufri, and A A Fajri	[1047]
15.00 - 15.15	R P Sari, M Adlim, and A Gani	[1051]
15.15 - 15.30	U Rahmi, Y Helsa, and Asrul	[1216]
15.30 - 15.45	Maisyura, C M Zubainur, and T F Abidin	[1072]
15.45 - 16.00	Ibrahim, N Yusoff, M I Awang, and Marwan	[1107]

Parallel Session 1, Room 6

Time	Author(s)	ID
14.00 - 14.15	N F Helmy, R Johar, and Z Abidin	[1023]
14.15 - 14.30	R Sulastri, R Johar, M Duskri, M Ikhsan, and Mursalin	[1036]
14.30 - 14.45	E Gradini & F B Bahri	[1037]
14.45 - 15.00	Agustan S	[1010]
15.00 - 15.15	M Ilyas, Ma'rufi, and Fitriani A	[988]
15.15 - 15.30	M S Harahap	[1013]
15.30 - 15.45	S F Zuhra, C M Zubainur, and T F Abidin	[1073]
15.45 - 16.00	N F Rizki, M Ikhsan, and Bahrun	[1083]

Parallel Session 1, Room 7

Time	Author(s)	ID
14.00 - 14.15	Musfiratul, J Yunus and Syahyuzar	[959]
14.15 - 14.30	Anwar & I Rofiki	[1123]
14.30 - 14.45	Nelawati, Netriwati, M S Lena, R W Y Putra	[961]
14.45 - 15.00	B A Saputro, D Suryadi, R Rosjanuardi, B G Kartasasmita	[964]
15.00 - 15.15	F Kristanti, C Ainy, and S Shoffa	[985]
15.15 - 15.30	Fadilah, Hasby & M Zaki	[991]
15.30 - 15.45	K Hasan, M Ikhsan, and Suhartati	[1082]
15.45 - 16.00	N Fadhillah & R johar	[1105]

Date : Wednesday, June 27, 2018
Time : 16.30 – 18.00

Parallel Session 2, Room 1

Time	Author(s)	IDE
16.30 - 16.45	R. Nuzulia, M. Hasan, and A. Ismayani	[924]
16.45 - 17.00	M J B Espiritu, M Shahrill, J S H Q Perera and R C I Prahmana	[928]
17.00 - 17.15	I Khaldun, M Hasan, and Nilawati	[1065]
17.15 - 17.30	R A Siregar, Festiyed, S Marsidin, and Ellizar	[1011]
17.30 - 17.45	J Low, M Shahrill, J S H Q Perera and R C I Prahmana	[929]
17.45 - 18.00	A S Pamungkas, Novaliyosi, I V S Yandari, and T P Alamsyah	[976]

Parallel Session 2, Room 2

Time	Author(s)	ID
16.30 - 16.45	Y Harisman, Y S Kusumah, and Kusnandi	[945]
16.45 - 17.00	S Adeliyanti, Suharto, Hobri, Sudirman	[946]
17.00 - 17.15	I Widiati & Sthephani	[952]
17.15 - 17.30	I wasilah, A Murni, and Jalinus	[956]
17.30 - 17.45	Ma'rufi, M Ilyas, Salwah	[989]
17.45 - 18.00	R Handayani, Hajidin, M Duskri, and M Maidiyah	[1008]

Parallel Session 2, Room 3

Time	Author(s)	ID
16.30 - 16.45	Sakur, A Murni, and R D Anggraini	[958]
16.45 - 17.00	D Herawaty, W Widada, T Novita, and L Waroka	[1012]
17.00 - 17.15	M Iqbal, Yusrizal, and Z Abidin	[1022]
17.15 - 17.30	Mauliana, M Ikhsan, and M Subianto	[1027]
17.30 - 17.45	A Saleh	[1048]
17.45 - 18.00	I N Aini, Zulkardi, R I I Putri, Turmudi	[990]

Parallel Session 2, Room 4

Time	Author(s)	ID
16.30 - 16.45	Zulfikar, M Ikhsan, and Marwan	[1024]
16.45 - 17.00	R Amalia, S Saiman, and M Mursalin	[1043]
17.00 - 17.15	L A Daulay	[1050]
17.15 - 17.30	M Husna, R Johar, Hajidin, and Mailizar	[1063]
17.30 - 17.45	Muchsin, Anwar, and A Ahmad	[1064]
17.45 - 18.00	Meilantifa & M T Budiarto	[1081]
18.00 - 18.15	C M Zubainur	[1309]

Parallel Session 2, Room 5

Time	Author(s)	ID
16.30 - 16.45	Mursalin, M Fonna, Muliana, Nuraina, H Nufus, I Muhammad, Rohantizani & R Sulastri	[1045]
16.45 - 17.00	M Warahmah, A Ahmad, and M Duskri	[1039]
17.00 - 17.15	Darmawijoyo, Hapisah, Somakim	[1040]
17.15 - 17.30	F Nursyahidah, A Fahrurozi, S Maesaroh, and I Suwanto	[1056]
17.30 - 17.45	Andriani, M Ikhsan, S Munzir, and C Khairunnisak	[1059]
17.45 - 18.00	I K Sari	[1119]

Parallel Session 2, Room 6

Time	Author(s)	ID
16.30 - 16.45	M Madlim, M Mahyuna, I Saminan	[1052]
16.45 - 17.00	M A Sarong, Supiyatno, Asiah MD, M Saputri, and A Mursawal	[1053]
17.00 - 17.15	M C Tri Atmojo	[1054]
17.15 - 17.30	A Abdullah, L Fitriana, and M A Sarong	[1057]
17.30 - 17.45	A Ansari, A Gani, I Khaldun, and M Bahi	[1061]
17.45 - 18.00	Yuhasriati & A Yuriansa	[1035]
18.00 - 18.15	T Zubaidah	[1305]

Parallel Session 2, Room 7

Time	Author(s)	IDE
16.30 - 16.45	F Pangaribuan	[926]
16.45 - 17.00	B Panjaitan	[940]
17.00 - 17.15	B Yustananingrum, E Rahmadhani, and Nurliana	[1055]
17.15 - 17.30	D Mayasari, M Ikhsan, Z Abidin	[1124]
17.30 - 17.45	Nurazmi	[1058]
17.45 - 18.00	K Idris	[1062]
18.00 - 18.15	C Khairunnisak, Elizar, R Johar	[1111]

Date : Thursday, June 27, 2018
Time : 08.30 - 10.00

Parallel Session 3, Room 1

Time	Author(s)	IDE
08.30 - 08.45	W Widjaya	[938]
08.45 - 09.00	R I I Putri and Zulkardi	[1303]
09.00 - 09.15	H Julie	[972]
09.15 - 09.30	R Novita, M Putra, E Rosayanti, F Fitriati	[1032]
09.30 - 09.45	I S Mulia, Irwandi, Rajibussalim, R Oktavia	[1301]
09.45 - 10.00	A Murni, R D Anggraini, and Sakur	[1067]

Parallel Session 3, Room 2

Time	Author(s)	Paper ID
08.30 - 08.45	A Fauzan	[1069]
08.45 - 09.00	D W Winarti	[979]
09.00 - 09.15	B Tanujaya, R C I Prahmana, and J Mumu	[933]
09.15 - 09.30	I Pratiwi, R I I Putri, and Zulkardi	[918]
09.30 - 09.45	S Janu Hartati, N Sayidah, and Muhajir	[951]
09.45 - 10.00	N Sahat, K A Tengah, and R C I Prahmana	[932]

Parallel Session 3, Room 3

Time	Author(s)	Paper IDE
08.30 - 08.45	T Y E Siswono, A W Kohar, S Hartono, R Ekawati, and P	[927]
08.45 - 09.00	Z H Putra and C Winsløw	[937]
09.00 - 09.15	Masniladevi, Ritawati, and Y Helsa	[1215]
09.15 - 09.30	R D Jannah, R I I Putri, Zulkardi	[919]
09.30 - 09.45	L Vitoria, Mislinawati, and Nurmasyitah	[1015]
09.45 - 10.00	Kamid, A Wandari and Rohati	[1129]

Parallel Session 3, Room 4

Time	Author(s)	Paper IDE
08.30 - 08.45	D Sulisworo, S Daimah, M Toifur, and A Suryadi	[939]
08.45 - 09.00	Y Roza, I Daqiqil, S N Siregar, S Salam, and A Adnan (Unri)	[1074]
09.00 - 09.15	R Permatasari, R I I Putri, and Zulkardi	[920]
09.15 - 09.30	J T Manoy	[947]
09.30 - 09.45	I Dewi, N Siregar, and A Andriani	[1003]
09.45 - 10.00	Hobri, S Romlah, A C Prihandoko, J Safitri, E Nazareth	[1014]

Parallel Session 3, Room 5

Time	Author(s)	IDE
08.30 - 08.45	A Winarti	[944]
08.45 - 09.00	W Artika and M Saputri	[1068]
09.00 - 09.15	Irwandi, Rajibussalim, R Oktavia, A Halim, Melvina	[1219]
09.15 - 09.30	R Amini, Usmeldi, Y Helsa	[1307]
09.30 - 09.45	R Verdina, A Gani, and Sulastri (Unsyiah)	[963]
09.45 - 10.00	S Hartini, M F Isnanda, M Wati, M Misbah, S Annur, S Mahtari	[982]

Parallel Session 3, Room 6

Time	Author(s)	IDE
08.30 - 08.45	E Juliangkary & R johar	[1110]
08.45 - 09.00	Masriyah, I Kurniasari, Evangelista L W Palupi	[1016]
09.00 - 09.15	Y Miaz , Y Helsa, Desyandri, R Febrianto	[1217]
09.15 - 09.30	H Nizar, R I I Putri, and Zulkardi	[921]
09.30 - 09.45	E Rahmayani, Irwandi, Rajibussalim	[1220]
09.45 - 10.00	S Manurung	[1304]

Parallel Session 3, Room 7

Time	Author(s)	IDE
08.30 - 08.45	Novianti	[1041]
08.45 - 09.00	Y Fitria, Y Helsa, H Nirwana, and R Febrianto	[1306]
09.00 - 09.15	W Yuni, R Johar, M Duskri	[1150]
09.15 - 09.30	E B Rahaju and P Wijayanti	[954]
09.30 - 09.45	D Yansen, R I I Putri, and Zulkardi	[925]
09.45 - 10.00	R Oktavia, Irwandi, Rajibussalim, M Mentari, I S Mulia	[1302]

TITLE OF KEYNOTE PRESENTATION

Professor Maarten Dolk: How do we let students work as 'young mathematicians' in the classroom?

Professor Kaur Berinderjeet: Models of in-service mathematics teacher learning

Professor Lilia Halim: The effectiveness of STEM mentoring program in promoting interest towards STEM

Dr John Willison: Models of Engaged Learning and Teaching for online learning design

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LIST OF ABSTRACT

The 6th South East Asia Design Research International Conference

(SEA-DR IC 2018)

[912]

Students' algebraic thinking processed in mathematic problem solving especially on function discussion basic material based on mathematic ability

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Abstract. This purpose of this research is to describe students' algebraic thinking processed in mathematic problem solving based on mathematic ability with cluster studied. This research was conducted by using quantitative approach with descriptive method. Elements of algebraic thinking used Kieran (2013:) like as problem solving ability, representation ability, and quantitative reasoning ability which had modified by importan researched. The results showed that algebraic thinking proocessed by high mathematic ability get GOOD performance, algebraic thinking processed by intermediate mathematic ability get GOOD performance, and algebraic thinking processed by low mathematic ability get LESS performance. great care should be taken in constructing both.

[918]

PISA-like mathematics problems using the context of athletics in Asian Games

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Abstract. This study aimed to produce a set of valid and practical PISA-like mathematics problems using athletics in Asian Games. This study involved the tenth-grade students of Senior High School. This study used a design research method type of development studies consisting of two stages: preliminary and formative evaluation. The formative evaluation stage, the stages consisting of self-evaluation, expert reviews, one-to-one, small group, and field test. However, this study only showed the result at the preliminary to the small group stage. The data collection techniques used were walkthrough at the expert reviews, observation of the video recording of students' discussion and interview during the learning process, and students' answer. The result of this research was valid and practical of six items PISA-like mathematics problems content of uncertainty and data using athletics context in Asian Games at level 3, 4, 5, and 6. Valid criteria can be seen from content, construct, and language. While practical criteria consist of easy to understand, contexts that students recognize, and can be used in learning. Also, the result of this study showed that athletics contexts used made students more active in the discussion and could to express the various reason.

[919]
PISA-like mathematics problem: basketball context in Asian Games

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Abstract. This research aimed to produce valid and practical PISA-like mathematics problem that included uncertainty and data content by using basketball sports conducted in the Asian Games. The researchers developed a problem based on two stages in the design research with development studies consisting of preliminary and formative evaluation stage. The data collection techniques used were walk-through, document, observation, and an interview. The results showed that the developed problem met the valid and practical criteria. The qualitative validation was derived from the validator's assessment concerning content, constructs, and language issues. It involved two PISA team experts from Australia, one expert from Indonesia at the expert reviews phase, and the students' comments on the clarity/readability of the phase one-to-one. The practicality of the problem, then, was obtained in the small group phase by involving six tenth-grade students of Senior High School. It was found out that students had been able to comprehend the purpose of the problem.

[920]
Uncertainty and data content in bowling: task design

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Abstract. The students still difficulties in solving the PISA-like mathematics problem on uncertainty and data content. It is because the students were never solving context-based problems such as PISA. This research aimed to produce the valid and practical of PISA-like problems using bowling context. This research involved tenth-grade students of the senior high school in Palembang. The research method used is design research with development studies type through two phases: the preliminary and formative evaluation. In preliminary phase have been reviewed some of literature and design. Meanwhile, formative evaluation phase only consists of self-evaluation, expert reviews, one-to-one, and small group. The data collection techniques used were walkthrough, document, observation, and interview. This research produced two valid and practical problems using bowling context. From the expert reviews and one-to-one, the problems using bowling context have been well based on content, constructs, and language. From the small group, the problems could be understood and easy to used by students. In addition, the bowling context that used could involve students' mathematics literacy ability such as communication, representation, reasoning and argument abilities to find the concept, give perception, and can interpret the problems.

[921]
PISA-like mathematics problem with karate context in Asian Games

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Abstract. This research objective produced valid and practical PISA-like mathematics problem with karate context in Asian Games. The subject of this research was tenth-grade students of Senior High School. The methodology used is design research with the type of development studies. This research had two stage that were preliminary and formative evaluation consisting of self-evaluation, expert reviews and one-to-one, small group, and field test. In this research, only presented the result on expert reviews, one-to-one, and small group phase. Data collection techniques used were walk through, document, observation, and interview. The research had produced valid and practical PISA-like mathematics problem with karate context in Asian Games. Valid could be seen from the assessment of validator (expert) regarding content, construct, and language used and workmanship of students in the phase one-to-one. Practical could be seen from workmanship of students in small group phase where the student could understand intent or language of problem.

[924]
Identification of conceptual and algorithmic understanding relationship with students Intelligent Quotient levels (IQ)

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Abstract. Research on the relationship of conceptual and algorithmic understanding with Intelligent Quotient (IQ) level aims to identify the relationship of conceptual and algorithmic understanding with the IQ level of high school students and to know the percentage of students with algorithmic and conceptual understanding. The sampling technique is using simple random sampling technique. The subjects of this study were high school students with 50 samples. The type of approach in this research is quantitative, and the method used is descriptive. The data were collected by using test instruments and questionnaires. Data processing is done qualitatively in the form of percentage and quantitative data processing using t-test for comparison of two classes and r-test for hypothesis test. The result of data analysis shows that there is no difference of conceptual and algorithmic understanding of class I and class II. Based on the percentage of conceptual and algorithmic understanding obtained on A1C1 as much as 8%, A1C0 as much as 4%, and A0C1 as much as 20%. The hypothesis test results obtained at a significant level of 5%, concluded there is a relationship between conceptual and algorithmic understanding with the level of student IQ. Furthermore, it is necessary to do research on conceptual and algorithmic understanding and its relation to EQ or SQ.

[925]
Mathematical problems of PISA-like with 200m swimming contexts in Asian Games

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Abstract. This study aimed to develop valid and practical mathematical problems of PISA-like with 200m swimming contexts at the Asian Games. The subjects were tenth-grade students of Senior high school, The research methodology used was designed research with the type of development study divided into 2 stage, namely preliminary and formative evaluation. The preliminary stage included the student analysis, curriculum analysis, and analysis of PISA problems. Formative evaluation stage included one-to-one that all together with the expert reviews than the small group. Data collection techniques used were documentation, walk through, interview, and observation. This study aimed to produce a valid and practical mathematical problem of PISA-like with 200m swimming contexts at the Asian Games. Valid based on the results of the validator assessment at the expert reviews phase and panel discussion which states that the matter had been well viewed in terms of content, constructs and language and workmanship of students at the one-to-one phase. Practical could be seen from small group phase that students could use the problem device well.

[926]
Students' abstraction in solving two variable linear equation

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Abstract. The objective of this reseach is to describe students' abstraction in solving two variable linear equation system. Refers to research objective, the data was analyzed based on qualitative method. The data is gained from result of solving mathematical problem in worksheet and from interview on students. The research finding shows that students can solve two variable linear equation in formal symbolic by abstraction which is shown in this paper.

[927]
Dilemmatic situations for learning mathematics-related beliefs

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Abstract. This study aims at investigating how dilemmatic situations related to teaching problem-solving task were used as context in a set of instructional materials for learning teachers' mathematics-related beliefs. The dilemmatic situations were refined along with the development process of the instructional materials within a developmental research following formative evaluation stages of Tessmer (1993). The situations provoke preservice teachers to select one of three types of teaching sequences which correspond to three hierarchical beliefs about nature of mathematics: Instrumentalist, Platonist, and Problem-solving as well as their corresponding categories of teacher beliefs related to mathematics teaching and learning. Results show that the dilemmatic situations could encourage preservice teachers to consider which values they should follow since such values conflict and there seems to be no right thing to do. On one hand, the preservice teachers agree to the Problem-solving view, on the other hand, they are confronted with the immediate situations found in their instructional practice which makes them hesitant in having Problem-solving view. However, this lead teachers show a good understanding of the borderline between those three type of hierarchical beliefs. Furthermore, the instructional materials were proved to potentially effect on improving preservice teachers' mathematics related beliefs and attract preservice teachers' interest in learning mathematics-related beliefs through dilemmatic situations.

[928]
Formative assessment in science education: Is it being practiced?

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Abstract. This study investigated the formative assessment practices in Science education in relation to the enhancement of student learning. The sample comprised of three teachers and 114 students at the Year 9 to 11 levels at one of the private secondary schools in Brunei Darussalam. The study was carried out in three phases: classroom observations, dissemination of the teacher/student self-reflection surveys and individual interviews with the teachers. The findings revealed that the weaknesses, such as the partial use of formative assessment and few student-led discussions that outweigh the strengths of the current formative assessment practices at this particular secondary school. Despite the teachers' attempts to improve the process of teaching and learning, there is a need to change their mindsets and upgrade their skills so that the formative assessment in Science education can be implemented successfully.

[929]

Characterising formative assessment practices in the mathematics classes

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Abstract. This study investigated how formative assessment is conducted in one of the secondary schools Brunei Darussalam. A framework that consisted of the five key strategies was utilised to observe two mathematics teachers teaching at the Year 7 and Year 10 levels. The qualitative approach was used in analysing the data in which two classroom observations and interviews with the teachers and randomly selected students were conducted. From the lesson observational findings, only a few of the characteristics from the modified key strategies were observed. The interview findings revealed contrasting findings with one teacher being aware of using formative assessment in her lesson and using activities to access her students' understandings of the lesson. However, the other teacher was not aware of using formative assessment in her lesson and prefers her students to think independently. In order to improve the teachers' performance to teach formatively, more time should be given for the teachers to plan, reflect and design formative assessment activities.

[930]

The learning trajectory of social arithmetic learning using Kubuk Manuk Indonesian traditional game

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Abstract. This research is aimed to design mathematics learning trajectory in social arithmetic using Kubuk Manuk Indonesian traditional games as starting point or context in the learning process with Pendidikan Matematika Realistik Indonesia (PMRI) approach. The method used is a design research that contains three stage , that is preliminary design, teaching experiment, and retrospective analysis. The result of this research is the design learning trajectory of arithmetic social using Kubuk Manuk Indonesian traditional game that consists three activities, that is a student playing Kubuk Manuk level 1, the student playing Kubuk Manuk level 2, the student playing Kubuk Manuk level 3. The results showed Kubuk Manuk Indonesian traditional game can stimulate students to understand their knowledge of social arithmetic concept and the stages in the learning trajectory of student have an important role in understanding the concept.

[931]
Enhancing manipulation of algebraic equation using balance method

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Abstract. This action research study measured the effectiveness of the Balance Method as an intervention in teaching and learning of manipulation of algebraic equation. Three lessons were specifically designed as intervention in the learning of manipulation of algebraic equation, which transition from the use of manipulatives to written work, making use of Balance Method concept. A paired sample t-test revealed that there was a significant improvement in students' performance on the topic after the intervention lesson using Balance Method. More answers that are correct were obtained when students used Balance Method, compared to their previous failed attempts or incorrect attempts when using other method. Whereas interview revealed that whether students prefer Balance Method or others, they correctly attempted manipulation of algebraic equation through Balance Method, particularly with equations that involved combination of operations. This provides evidence that Balance Method should be introduced and taught as the correct concept of manipulating algebraic equation at students' first encounter of the topic.

[932]
Using manipulative in the teaching and learning of addition and subtraction of integers in Brunei Darussalam

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Abstract. This action research looked at how the use of manipulatives in the teaching and learning of integers could affect students' performances in adding and subtracting integers, involving Year 9 students from two mixed ability classes of the same government secondary school in Brunei. The design research of the intervention lessons used different coloured counters to represent different signs of integers, followed by the adding and removal actions of these counters to mirror the addition and subtraction operations, with the added concept of zero-pair. The data collection consisted of pre-test and post-test. With the use of descriptive statistics and Wilcoxon Signed Ranked Test, this study concluded that there was significant improvement on students' performances in the post-test and the effect size showed that the intervention gave big impact towards students' learning. Item analysis indicated that the intervention improved correct attempts in questions involving both addition and subtraction, with bigger increase in the latter. The overall mean scores of correct attempts in the post-tests also showed that students scored higher on addition of integers (89.7%) compared to subtraction of integers (81.0%).

[933]
Designing learning activities on conditional probability

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Abstract. This study aims to design student-learning activities on the concept of conditional probability using the development of test items. The method used is design research implemented in three stages, namely preliminary design, teaching experiment, and retrospective analysis. The study conducted on 47 mathematics education students of the University of Papua who took mathematics statistics lesson. The research produces learning trajectory, which contains a series of the learning process that students can develop conditional probability test items in three versions, determine sample space, formulate and use conditional probability formula. The results of the research show that the development of test items with the approach namely observe, imitate, and modify can help students understand the concept of conditional probability.

[937]
Teacher's collective knowledge: the case of equivalent fractions

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Abstract. Research on teachers' mathematical knowledge has grown significantly over the last few decades. Many studies concern teachers' individual knowledge by using written tests, as for students. But in reality, teachers do not work in isolation but in institutions where professional knowledge is shared. How can this shared or collective knowledge be studied systematically and precisely? With this in mind, we designed so-called hypothetical teacher tasks (HTTs) which teachers solve in pairs. Each HTT can be used to investigate teachers' knowledge of some specific mathematical piece of knowledge (like how to add fractions) and knowledge about how to teach it. We present a case from Danish and Indonesian pre-service teachers' collaborative work on one HTT about equivalent fractions. We analyse how the shared mathematical and didactical knowledge of equivalent fractions differ between the two groups. Certainly, there are manifest differences.

[938]

Assessing students' mathematical reasoning: variations in grasping and communicating generality among year 6 students

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Abstact. Providing opportunities for students to develop their capacity to form and communicate generality is regarded as integral part of learning mathematics. Earlier studies draw attention to the role of noticing invariance and variance as a critical feature required to form generalisation. This paper examines variations among Year 6 students' reasoning as they were grasping generality and communicating generality based on their written responses and their verbal communications. Data in this paper were taken from the first phase of trials from four Year 6 classes from two primary schools in Victoria, Australia. The data were analysed qualitatively to examine children's written explanations to the mathematical reasoning tasks. In addition, evidence of children's reasoning and generalising captured on video-recordings during the lessons would complement the analysis of their written work. Forms of grasping generality and communicating generality will be classified informed by Variation theory. Using design-based research methodology, a rubric for primary teachers was developed to formatively assess students' mathematical reasoning. The findings highlight the value of making students' reasoning visible and audible through written communication and verbal communication.

[939]

The impact of using line@ on the cooperative learning to improve the critical thinking skills for the higher school student

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Abstract. The widespread use of social media opens new opportunities in various fields including in education. This study aims to determine the influence of social media usage in this case LINE@ on cooperative learning environment to improve critical thinking skill. This research was conducted on grade XI students on physics, especially for Elasticity subject. The method used in this research was the quasi-experiment with pretest posttest controlled group design. The independent variable of this research was learning strategy. The dependent variable was critical thinking skill as measured by essay. The covariates used were prior knowledge measured by multiple-choice questions. Statistical analysis technique used ANCOVA with the error margin of 5%. The results show that students who received cooperative learning using LINE@ tend to have better critical thinking skills after learning compared to conventionally taught students. Prior knowledge can be used as a predictor to know the level of critical thinking skills. The contribution of previous knowledge is relatively small which means that the role of learning strategy is relatively high in influencing the improvement of critical thinking skills.

[940]

The reflective abstraction profile of junior high school students in solving mathematical problem based on cognitive style of field independent and field dependent

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Abstract. The question of this research is how the students' abstraction profile who have cognitive style of field independent in solving mathematical problem and how the students' abstraction profile who have cognitive style of field dependent in solving mathematical problem. It is qualitative research. the subjects of this research is one (1) student who has cognitive style of field independent and another one (1) is the student who has cognitive style of field dependent. The data is gained from result of solving mathematical problem and from interview. data was analyzed based on qualitative method. The research finding shows that students' abstraction profile whose field independent of cognitive style is different from students' abstraction profile whose field dependent cognitive style in solving mathematical problem.

[943]

Designing student worksheet for rich mathematical tasks

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Abstract. Rich tasks design is not only the design of non-routine and contextual task to be solved by students, but also this requires a supporting document for mathematics instruction using this approach. This study developed a student worksheet that would act as a cognitive scaffolding for students in the initial stage of solving rich tasks process before they internalize the metacognitive strategies and automate the use of these strategies when faced with a new mathematical task. It describes the design and use of the student worksheet, within our ongoing rich tasks research project. The study was conducted within research and development design which consisted of three phases: preliminary research, designing and experimenting phase. This paper is primarily concerned with the first and second phase of development study by focusing on the design of rich task based student worksheet and implication for pedagogy. One mathematics teachers and 20 students from one of junior high schools in Banda Aceh were involved in this study. The study found that the student worksheet holds promise for teachers who want to improve the students ability in solving rich mathematical task in the mathematics classroom. Teachers can now not only encourage solving rich tasks in their classes, but they can also make transparent to students the criteria for assessment and the processed that are valued.

[944]

The development of webbed integrated learning strategy in a science subject to build students' awareness of wetland environment

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Abstract. This study aims to build students' environmental awareness through the development ofwebbedintegratedlearning strategy in Science subject bypracticing listening skill and science process skill. This research employed Research and Development (R & D) model with four D model namely Define, Design, Develop, and Disseminate by applying the iterative principle. The formative tests in this study used the Tessmer method. The tryout sampling was students of class the seventh grade of SMPN 4, SMPN 5, and SMPN 17 Banjarmasin in a number of 100 students. The product development was in the form of webbed integrated thematic learning strategy on the subjects of natural science (IPA), Indonesian language, English, and Civics in the form of a valid, practical, and effective learning devices in building the environmental awareness. The instruments of this study werea questionnaire and a science skill test process. The validity and practicality data were analyzed by using percentage technique. The ecological awareness and science process skills data were analyzed byusingpercentage technique as well. The results showed that: (1) the developed learning devicesare very valid with the average validity score of 4.2. The readibility test indicates that the readability of the students' worksheetsor Lembar Kerja Siswa (henceforth LKS) material is good and meets the criteria of readability. (2) The integrated learning devicesof the developed webbed model arepractically used, with a practicality score of 4.2 and the students' activity of 85.4%; (3) The developed webbed model integrated learning strategy is effective in building environmental awareness and developing science process skills.

[945]

Teacher reflections on students' mathematical problem solving in junior high school

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Abstract. This research was designed to answer the question of how the category of teacher reflection on learning process in mathematical problem solving. This research adopted qualitative research with grounded theory and systematic design, combined with the research design (DR) development model. Three teachers from three senior high schools with different clusters were selected as research subjects. Teaching and learning process was documented during three meetings. The selected material was geometry, because it would discuss the process of mathematical problem solving. The learning video was analysed to create open questions that could explore how teachers reflected on the learning process they did. The teachers together with the researcher watched the video to reflect the conducted teaching and learning process. The teacher was given several questions which were displayed on the video. The study revealed three categories of teacher resulted in their reflections process after they finished teaching and learning process. The resulted category consists of excellent, very good, and good teacher. Each category would be clearly describe in this paper.

[946]

The level of secondary students' creative thinking in the mathematics classroom by using *e-Comic* math teaching media

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Abstract. The purpose of this study was to analyze the level of secondary students' creative thinking by using e-Comic mathematics learning media. The study design was descriptive research using qualitative approach. Operationally, the steps of this study included the initial step of research, collection of data, and the data analysis. Data was obtained by documentation, observation, interview, and test. The results showed that 10 students were categorized in the different levels of creative thinking, and they in percentage ranged from 20%, 30%, 20%, 10%, and 20% were respectively categorized very creative (level 4), creative (level 3), creative enough (level 2), less creative (level 1), and not creative (level 0). Of the 10 students, two students belonged to the same category of creative enough (level 2) although they had different answers in the test as can be seen in the detailed description of creativity. This means that e-Comic media can be used to see students' creative thinking level and to provide attractive learning materials that promote students' ability in creative thinking.

[947]

Elementary students representation in solving word problems

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Abstract. The mathematical representation is important for student as a means of communicating their ideas in making it easier to solve the problems faced. In solving word problem, students learn to develop their own models because in principle every individual has their own way to understand something. The purpose of this study is to describe the representation of third grade elementary school students in solving arithmetic operations mixture word problems. Student representation data obtained from tests outcome related word problems and interviews about assignments based on 2 students. The results showed subject using a representation by image, mathematical expression and word representation. There are several representation by images and tiered division. Completion ideas generated comes from student's prior knowledge, so the completion by subject is inter-related .

[950]

The study of the mathematical problem solving and metacognition strategy on a paired handep cooperative learning model

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Abstract. The aim of the research is to create the draft of handep cooperative learning model at single path prototype level, to evaluate the feasibility of model components and to assessed the problem solving and metacognition questioning strategy fulfilment, to get the model of mathematical problem solving and metacognition strategy based on the local wisdom. Research and development used the Recursive, Reflective, Design, and Development-Dissemination (R2D2). The development focused on handep cooperative learning model construction. The learning technology expert reviewed the feasibility of the model, The mathematics-learning expert validated the fulfillment of problem-solving and metacognition questioning strategy. Instruments include questionnaire and rubrics. The result of the paired handed cooperative learning model and experts validation result concluded that learning technology experts agreed that the components of the model are feasible as a model of cooperative learning. The mathematics-learning experts find that the model has feasibility for mathematical problem-solving strategies. For advanced expert validation, it is recommended to assess the fulfillment of critical elements of the handep cooperative learning model.

[951]

The use of cipp model for computational algorithm learning program evaluation based on learning style

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Abstract. This research aims to evaluate the learning program of computational algorithm subject for students with below average mathematical ability in two private universities in Surabaya. The evaluation was performed by using the theoretical framework of Context, Input, Process, and Product. There are two research questions presented in this work: what is the research design to evaluate the learning program, and what is the profile of the computational algorithm subject learning program according to CIPP. The result showed that the research design of CIPP implementation for computational algorithm subject learning program required five steps, which were to determine the focus of the research, to collect the data, to test the validity and reliability of the instruments, to analyse the data, and to draw a conclusion. According to CIPP model, the computational algorithm subject learning program had the profiles: the pre requirement of the program environment did not correspond with the population's characteristics, 70% of the students came from lower middle economy class, 90% of the students did not know the importance of mathematical thinking in learning computational algorithm, learning facilities and supporting instruments were not sufficient, learning plan was adjusted in accordance to the students' condition, the used learning medias were not optimally functioning yet, the average of computational algorithm score was 49, while the percentage of honesty value reached 80%, hard work value reached 30%, and discipline value reached 80%.

[952]
Difficulties analysis of mathematics education students FKIP UIR on real analysis subject

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Abstract. This study aims to describe the difficulties of students in Mathematics Education of FKIP UIR in Real Analysis Course. The study was conducted on the even semester for year academic 2016/2017. The type of research conducted was qualitative research with descriptive method. The population of research in this research was all the students of FKIP-UIR on 4th semester included 4C and 4D students of Mathematics Education of FKIP UIR. Data collection techniques were test techniques, questionnaires, interviews, and observations. Data analysis was done by questionnaire analysis, interview sheet analysis, observation result analysis, and analysis of test result about Real Analysis. The results showed that the difficulties of experience by students in learning Real Analysis are: (1) Students are difficult to find the initial idea of the proof process; (2) Students still do not have the ability to think critically, logically, creatively, reasoning, and good systematic; (3) Students are still easy to give up, lack of confidence, lack of care, and less ability to socialize with a heterogeneous group of friends; (4) Difficulties in conducting direct and indirect evidence in determining what type of proof are used; (5) Difficulties in expressing ideas into nonverbal Language; (6) could not remember/could not understand the previous theorem; (7) Not having a good understanding of the prerequisite materials; (8) Prove that it will prove or substitute the numbers into the proof of the theorem; (10) Just memorize the theorem without understanding it; (11) Difficulties in relating definitions and theorems to the given problem, (12) The lack of a source book to support the learning process.

[953]
Students' collaborative ability in learning geometry transformation by using scientific approach based on learning community

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Abstract. 2013 curriculum is a concept of scientific approach which is based on the logical explanation fact. Based on this approach, students are expected to be able to find the answer through structured scientific process. However, students often makemistakes in answering the questions about geometry transformation. Therefore, there is a need for a learning that involves multi parties, such as friends and parents. In this paper we propose learning community-based learning. This research aims to explore the improvements instudent's collaborative ability by applying Learning Community-Based Scientific Approach on the material of geometry transformation. The research was conducted in 3 cycles, and every cycle has 3 steps of plan-do-see, based on the learning cycle in lesson study. This research was conducted in one of the high schools in the east of Java, Indonesia during the even semester in the academic year of 2017/2018. The research subjects were the students of XI science 1. The data were analyzed by using qualitative descriptive method consisting of data reduction, data presentation and conclusion. The data were gathered by using observation, test, and documentation. The result shows that there is an improvement in their ability to learn mathematics collaboratively. They were able to to work together and appreciate the opinions of other members of their group and of other group.

[954]

The development of student worksheet by using discovery-based approach: A case study in the learning media course

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Abstract. Regard to the national curriculum for primary and secondary school, the department of mathematics University of Negeri Surabaya through Indonesia National Qualification Framework (KKNI) have tried to adjust the demands of National Curriculum 2013. The department proposed an innovation through Learning Media course. The aim of this study was to produce student worksheet by using discovery-based approach which had been developed by students. It was development research based on Plomp's model. It was about 38 students involved. Validation and Development Task were used as a research instrument. This study produced 11 student worksheets for junior high school and 8 student worksheets for senior high school. Regarding the validation result, it could be summarized that a) Discovery activity matched with the goal of learning which have been obtained in advance, b) student worksheet had involved student initial knowledge, c) Discovery stage already matched with student cognitive development, however it still can be found unsorted stages, d) Discovery activity had guided student to make a conclusion, e) Discovery activity which explore alternative solution were less than 50%, f) The answer of student worksheet were correct and match with the worksheet, g) It still could be found that student worksheet had grammatical error therefore revision were needed.

[955]

The effect of implementation discovery learning model toward students' mathematical understanding ability at grade IX SMP Negeri 1 Kampar Timur

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Abstract. This research is a part of development research with 4D model which have done starting form define stage, design stage, and developt stage. This paper put forward the result of effectiveness test. The population is all students of class IX SMP Negeri 1 Kampar Timur and the sample consists of two classes, where class IX_1 as experimental class and class IX_2 as control class. The purpose of this research is to see the effect of implementation discovery learning model toward students' mathematical understanding ability of the topic of curved side space. The research instrument used is the mathematical early ability test and the mathematical understanding ability test (postest). The results showed that the implementation of discovery learning model gives a positive effect on the mathematical understanding ability. Implementation of discovery learning model has an effect of 76% on the students' mathematical understanding ability at grade IX SMP Negeri 1 Kampar Timur and included in the medium category.

[956]

Mathematics learning device development through discovery learning model implementation on circle topic for senior high school grade XI

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Abstract. The background of this research is the limited availability of mathematic learning device as supporting learning referring to Curriculum 2013. Learning instrument include student books, syllabus, Lesson Plan, Student Worksheet, post test, and instructional media. The purpose of this research is to produce mathematics learning device (Lesson Plan and Student Worksheets) which refer to discovery leaning model in circle topic for senior high school students with minimum valid criteria and practical. The research method used is 4D development model by Thiagarajan, which consists of define, design, development and dissemination. This paper will discuss about define, design and development. Based on the result of data analysis, it can be concluded that the mathematics learning instrument is very valid with the average assessment for the Lesson Plan and Student Worksheet respectively is 4.62 and 4.63. The practicality can be showed by legibility of the learning device and the results on percentage of student responses 94,61%, which mean the learning device has been feasible to be used in the learning for senior high school for grade XI.

[957]

Differences in students' learning outcomes that follow the learning through discovery learning implementation and conventional learning

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Abstract. The background of this research is the number of students' learning outcomes of grade IX SMP Negeri 1 Pekanbaru which is still under KKM (minimum completeness criteria) that has been established by the school is 82. The research form is experimental research with 2 sample classes that are experiment class and control class. The objective of this research is to see the difference of learning outcomes between students who follow the learning through the discovery learning model implementation and conventional learning on the building of curved side spaces. This research uses pre experimental research design using the design of The Static Group Comparison. The results showed that there are differences in learning outcomes between students who follow the learning through the implementation of model discovery learning and conventional learning.

[958]

The effectiveness of learning devices on the subject of the set with problem-based learning at Islamic Junior High School Bustanul Ulum Pekanbaru

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Abstract. This research is a continuation of research on development of class VII learning device on the subject matter of set. The researchers through Research and Development was developed learning devices in the form of lesson plan and worksheet. Now, The learning devices are then need to be tested effectiveness through experimental research with 2 class of sample that is experiment class and control class. The research purpose is to see the differences of learning outcomes between a class that uses learning devices on the subject of the set with Problem-Based Learning and a class that uses the conventional learning model at class VII Islamic Junior High School Bustanul Ulum Pekanbaru. This research used the pre-experimental research design of the static group comparison. The result is that the learning outcomes of learners of the class that uses learning devices with Problem-Based Learning (PBL) model is better than the class that uses conventional learning model.

[959]

Year 8 Students' strategy in solving Higher Order Thinking (HOT) skills

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Abstract. Higher Order Thinking Skill (HOTS) is an abstract ability in the cognitive domain of the educational taxonomy including the ability to analyze, evaluate and create. PISA with level 4, level 5, and level 6 are categorized into HOTS. Research shows that in 2000, 2003, 2006, 2009, 2012 and 2015 Indonesia is lowly ranked in PISA. This is because the students are not familiar with HOT problems or non-routine problems and they have not been trained to solve the problems. Mathematical problem-solving can be done using the right strategy. This research aimed to examine the strategies used by students in solving the HOTS problems. The HOTS problems used is the PISA problems of level 4-6. The subjects in this study were Year 8 students of one of the junior high school in Banda Aceh, while the object of the study was the result of students' written test. This is a descriptive research employing a qualitative approach. To obtain data, written tests and interviews were conducted and the data was then analyzed using Reys strategy. The results showed that: (1) 51 students used strategies to take action, (2) 13 students used guessing strategies and testing, (3) 12-student used pattern-finding strategy, (5) Three students used a three-step back-up strategy and (6) One students used a similar problem-solving strategy.

[960]

The effect of mathematical thinking ability using modified Moore method towards students' combinatorics learning result of University of Riau

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Abstract. Combinatorics is one of the subjects that can develop students' thinking ability . The learning result of combinatorics that reached by the students has not been maximal, causing the students difficult to build their own knowledge to find the concept. One alternative that can be taken to improve student achievement is through creativity in choosing innovative learning models. One of the learning method that can be applied is the Modified Moore method. This study aims to determine the ability of mathematical thinking with modified Moore method toward Combinatorics learning result on presevice students teacher of Mathematics Education Study Program FKIP Universitity of Riau. This form of research is quasi experimental research. The design in this research is The Single Group Pretest/Post test Design which included Quasi Experimental Design Without Control Group. The sample of this research is one class of preservice teachers student of mathematics education program 5th semester Class A FKIP University of Riau in odd semester of academic year 2017/2018 with number of 20 peoples. Samples were taken using purposive sampling. Based on the results of research and discussion that can be concluded: there are effects of mathematical thinking ability using Moore Modified method on students' Combinatorics learning resultsof Mathematics education odd semester of academic year 2017/2018.

[961]

Development of teaching materials of elementary school student with a scientific approach characterized by ethnomathematics

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Abstract. The aim of this study was to find out how development of teaching materials of elementary school students with a scientific approach characterized by ethnomathematics. This research was research and development (R & D) with 4D research model namely, define, design, develop, and disseminate. Sampling of this research was at SDN 1 Terpadu Karang Kemiri dan SDN 2 Karang Kemiri. The results of the assessment were: assessment materials experts consisting of land educator was 80.78% is categorized as very feasible, media experts gave a score of 65.47%, categorized as feasible, and cultural experts gave a score of 80.00%, categorized as very feasible. In the pilot phase of a small group, it was gained an average of 3.18 with a good category. The pilot of field test gained an average of 3.34 with a very good category. It can be concluded that the development of teaching materials of elementary school students with a scientific approach characterized by ethnomathematics was categorized as very feasible and attractive to use in teaching at elementary level equal to the material plane.

[963]
Improving students'higher order thinking skills in thermochemistry concept using student worksheets

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Abstract. The purpose of this research was to develop and to evaluate a student worksheets (SWS) for teaching and learning thermochemistry which could improve higher order thinking skills by senior high school students from a science class in Banda Aceh. This research used the Research and Development method developed by Borg and Gall. The higher order thinking skills was measured using essay test. Based on the N-gain result it achieved an average value of 79% which is in the high category. The results showed that there was an increase from the average pre-test score of 36 to the average post-test score of 87 so that it could be said that there had been a change for the better after the teaching and learning. Therefore the SWS that was developed can be used as material for teaching and learning of Thermochemistry that can improve students' higher order thinking skills.

[964]
Analysis of student error in responding to TIMSS domain algebra problem

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Abstract. The purpose of this study is to understand the errors of students learning with the 2006 curriculum and students learning with the 2013 curriculum in answering the TIMSS algebra content. Fifteen questions of knowledge domain algebra and application are given to the students through the test. The wrong answer of the test is analysed to determine the weakness and excellence of algebra learning that has been done. the results showed that students studying with the 2013 curriculum were superior in solving the problem of domain algebra expression of application. Misconceptions about algebra and arithmetic are also found in student answers.

[966]
The development of instrument to explore non-routine problem solving strategies among mathematics education students

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Abstract. This research aimed at describing the validation results of instrument development to explore the non-routine problem solving strategies, especially the non-routine strategy assignment and interview guidelines. The validity of the assignment instrument is viewed from the aspect of accuracy, strategic direction, cognitive level, scope of the knowledge, and legibility of the problems. The interview guidelines instrument is evaluated by the ability to disclose the strategy, the nature of the question by being exploring and not guiding, and the clarity of the students' response. This is a development research using descriptive approach. The subjects were Mathematics Education students of Syiah Kuala University. The research instrument was validation sheet about non-routine problem solving strategy and interview guidelines. Data were collected by obtaining expert's opinion on the content and construct validity of the non-routine problem solving strategies assignment instrument, while the data collection for the trial was conducted through the task-based, semi-structured interview. Expert validation data then analyzed by reviewing thoroughly the experts' suggestion and opinion on the instrument validation, while the result of the trial is analyzed by describing the emerging strategies from student's response to the given problems. The validation result of instrument development indicates that the instrument and interview guidelines is applicable in order to explore strategies used by students in non-routine problem solving.

[969]
Eight grade students' mathematical problem-solving ability: public school case

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Abstract. Mathematical problem-solving ability (MPSA) plays an important role both in studying mathematics and in human daily life. It, therefore, makes sense if MPS becomes central and important for students to grasp from elementary until senior high school. Researchers had paid much attention on cultivating and fostering the students' competency albeit the fact revealed it remains belonged to the low category . This article reports the first stage of a research aimed at developing instructional materials based on discovery learning in order to improve students' MPSA. The research takes place at four public junior high schools (PJHS) selected from Medan and District of Deli Serdang, Indonesia. The findings of the research are: (1) the students' MPSA is categorized low; (2) the students experience difficult at almost every aspect of MPSA; and (3) neither exists variation in using strategy nor does any aid to attain the solution, (4) The solution of the problem lacks of explanation.

[971]
Designing teaching instructions that meet students' needs: Teaching solid geometry through problem based learning (PBL)

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Abstract. Teachers need to plan a lesson appropriately based on the needs of students. However, each student has different learning styles, interests, readiness, paces and abilities. It is teacher's responsibility to know how each student learns and what learning methods appropriate for them. This issue prompted the researchers to find a learning model that meets the needs of students on the volume of prism topic, and to group the students based on their achievement after implementing problem based learning (PBL) in order to know a group of students who experience success through the learning model. The subjects were 66 eighth graders from two classrooms in a junior high school in Banda Aceh, Indonesia. Making use of the discriminant analysis by Fisher, researchers categorized students' ability into two groups, successful and unsuccessful groups. The finding showed that 50 students were in a successful group and 16 students were considered unsuccessful. That means PBL met the needs of the 50 students and this finding suggests the implementation of another learning model for the 16 students in the unsuccessful group to find out a learning model best for them in learning solid geometry.
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[972]
Developing LTBI for addition and multiplication rules in probability theory with realistic mathematics education

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Abstract. There were three components on a hypothetical learning trajectory (HLT) that the researcher develop in this paper, namely: (1) the learning goal, (2) the learning activities, and (3) the way of students' thinking and learning. It is named a trajectory as a hypothetical learning trajectory because the student's learning trajectory was unknowable. A learning trajectory based instruction (LTBI) was defined as a teaching and learning trajectory that used HLT for instructional decisions. In this paper, the researcher will present a LTBI using Realistic Mathematics Education approach which helps mathematics education students following the Probabilistic Theory course to construct (1) the addition rule, and (2) the multiplication rule. The type of the research used by the researcher in this study was the design research developed by Gravemeijer and Cobb. There were three phases in the research development, namely (1) the preparation of the design, (2) testing the design, and (3) the retrospective analysis [1]. The researcher exposure in this paper was limited to the first stage of the design research developed by Gravemeijer and Cobb.

[974]

The development of text for school literacy movement in mathematics learning

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Abstract. This paper is development research to produce text of school literacy movement in junior mathematics learning. The developed text is organized based on Realistic Mathematics Education. This research uses research design research method with the type of research development or development studies and the evaluation flow used is formative study, including self evaluation, expert review, one-to-one, small group, and field test. In this article, the discussion of research on the expert review phase and one-to-one. The subject of research is the students of grade VII SMPN 1 Karawang Timur. Data collection is done by walkthrough and documentation. Based on the analysis, it is concluded that this research has resulted in a product in the form of text reading school literacy movement in mathematics valid. The prototype is said to be valid after being revised based on suggestions from experts and learners in terms of content, constructs, and language.

[976]

A worksheet aided GeoGebra for smartphone to enhance student's understanding in inequality topics

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Abstract. This research aims to develop worksheets in understanding in topic function of inequality. This topic is not a new topic for the students of the first level, but still found the students who do not yet understand the topic very well. Based on the results of the correction of the answers and interviews found that the students did not understand the interpretation of graphically a function which is being solved and less advanced in manipulating algebraic there did not find the solution. Based on the findings then design the worksheets aided geogebra for smartphones to improve understanding of the students on the topic of inequality. A worksheet consists of two parts that help students build their own understanding about the shape of the graph of an equation and the solution either graphically or procedural algebra. To view the worksheets do the eligibility validation by experts and test the practicality to students. The result of the revision is then distributed to 10 students. Students spend 60 minutes to complete. They are finding a solution of the problem which is given with the help of geogebra for smartphones, with the first completed in the graph and find the specified point in the diagram cartesius. Next they settle with algebraic manipulation as a form of confirmation of the above answers are obtained. After completing the worksheet as a whole, seen that students can complete these issues graphically well.

[977]

The validity test of the lesson plan to reduce students' misconceptions using the cognitive conflict strategy

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Abstract. Students' misconception will hinder the effectiveness of learning as well as disrupt the students' thinking in accepting the subsequent knowledge. The use of students' misconceptions is essential in improving students' conception through a meaningful learning. One of the learning strategies utilizing students' misconceptions to reduce the misconception is the cognitive conflict strategy. Therefore, it is necessary to develop a lesson plan to lessen students' misconception in learning using the cognitive conflict strategy. This study is limited to the analysis of the quality of the lesson plan on the topic of fraction by using the cognitive conflict strategy. The development method used in this research was the Plomp method focusing on the prototyping and assessment phase. The source of data for the validation test were obtained from three validators and one observer. The trial of the lesson plan was conducted for 14 Year 5 students in one of elementary schools in Bireuen district of Aceh. Based on suggestions from the validators, the lesson plan needs to be revised. The results of the validity test showed that the lesson plan for reducing students' misconception using the cognitive conflict strategy satisfied the valid criteria and can be tested for its practicality and effectiveness.

[978]

The different patterns of gesture between male and female in mathematical problem solving of algebra

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Abstract. This study has a significant impact on teachers to diagnose students' understanding of Algebra. So in general this study can know the correlation between gesture and students understanding in solving mathematics problem. The purpose of this research is to know gesture of male and female students in solving algebra problem. The type of research used was descriptive, and the research data was collected from algebra problem solving test, then the students were interviewed by using semi structural approach. The results of this study reveal that there is a difference between the gesture of female students and male students. Female students tend to give uncertain gestures, such as often bending their heads, hesitations and intonation of low voices, blinking eyes as they think of a concept, nodding their heads as they receive new information, moving their hands spontaneously with words or speeches. However, male students remain calm and confident when problems solving, always actively moving their hands and fingers spontaneously with speech or speech, thinking a little longer and focusing on the problem. For further research, it is advisable to observe more samples and focus on the consistency of male and female students' gestures in demonstrating their distinct and unique understandings.

[979]

Developing mathematics lesson embedded with spatial reasoning activities to support geometry learning

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Abstract. Spatial ability is a capability that is used in everyday life as well as one of the keys to be successful in the fields such as science, technology, engineering and mathematics (STEM). Numbers of research show the positive correlation between spatial ability and mathematics performance. This study has an aim to develop spatial reasoning activities within mathematics curriculum to support student's learning in mathematics particularly geometry. Two lessons (80 minutes for each lesson) for learning surface area and volume of a prism were designed. The implementation was conducted in two female classes of grade 8 students in West Nusa Tenggara, Indonesia. The data were obtained through video recording, observation form, students' worksheets and interview with some students. The data shows that the spatial reasoning activities within the mathematics lesson; such as drawing on isometric paper, forming a prism from connected cubes; give an opportunity for students to thinking spatially by visualising, predicting and checking the object and any manipulation involved. It helps students to contextualise surface area and volume of a prism and understand the concept of it before they go further to the formulation of the area and volume of a prism.

[982]

Developing a physics module based on Hulu Sungai Tengah regency local wisdom to train Murakata character

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Abstract. The research and development of a physics module on the topics of temperature and heat based on Hulu Sungai Tengah (HST) Regency South Kalimantan Province local wisdom was been conducted to trace the character of murakata. This study was conducted due to the unavailability of the physics module containing the local wisdom as well as a lack of comprehension to students on the cultural diversity in South Kalimantan. Therefore, this study was conducted and aimed to produce the physics module based on the local wisdom of HST Regency which is feasible on the basis of validity, practicality, effectiveness of the physics module and the achievement of the character of the murakata. This study was a research and development using ADDIE model. The subjects of the study were 30 students of XI MIA class at one of the high school in Barabai, HST Regency. The instruments used were a module validation sheet, a questionnaire, an achievement test and a student characteristic observation sheet. The results showed that: (1) the validity of the module is categorized as highly valid, (2) the practicality of the module is categorized as practical, (3) the effectiveness of the module as categorized as high and (4) the attainment of murakata character by the students is categorized as good. It can be concluded that the physics module of the topics of temperature and heat based on the local wisdom of HST regency to train murakata character is feasible to use in the teaching and learning.

[985]

The effect of creative problem solving learning model to level of Van Hiele's think and students outcome learning using Geometry Transformation's book based on Al-Quran

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Abstract. This paper is the implementation phase of design research, to analyses effectivity of Creative Problem Solving learning model using Geometry Transformation's book based on Al-Quran to enhance the level of Van Hiele geometric thinking and learning outcome of students. The implementation design in this research isused was quasi experiment with Pretest-Posttest Control Group Design. Determination of sample used random sampling technique covering 23 of 35 students of Mathematics education program of Muhammadiyah University of Surabaya.The content of Geometry Transformation's book based on Al-Quran includes the relationship between geometry concepts and Al-Qur'an which is the product of design research using questionnaires validation for experts, and small scala trials.The result of the development of this book showing the average results of the validation and testing is in the category with agood fit for use in accordance with the table eligibility criteria and product revision level. Descriptive analysis and ANAKOVA were used for data analysis, such as shows that the experimental class Van Hiele geometry thinking is 65.83 and the conventional class is 59.91. The experimental class learning outcome is 63.08, while the control class that is 59.27.

[988]

Analysis of senior high school students' emotional intelligence in cooperative based mathematics learning

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Abstract. Mathematics learning is a process of interaction between teachers and students in a learning environment deliberately created by teachers with various elements of mathematics learning to form the mindset, understanding, reasoning, and problem solving skills of mathematics. Character can be built through habituation including habituation in cooperative learning by integrating emotional intelligence. This article is part of research development of cooperative learning model of mathematics learning by integrating emotional intelligence in course of Mathematics Learning Assessment. The subjects of this research are X grade high school students. The focus of this article is to describe students' emotional intelligence that can be developed during applying cooperative-based mathematics learning to mathematics subjects. Data are collected through observation of learning and interview which then analyzed by using qualitative analysis. The results show that students can utilize emotions productively in learning mathematics with responsible indications, can focus the attention on worked task, confident, tenacious, skilled in communicating, better in listening to opinions of others, satisfied with the award given.

[989]

Pedagogical content knowledge mathematics teacher on finds the surface area of cube, cuboid, and prisms

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Abstract. Teacher is decisive in the success of classroom learning. This research was a qualitative research with descriptive approach. The data collection was started begins with observation of a mathematics teacher who teach at SMPN 12 Palopo. PCK math teacher in teaching the surface area of cube, cuboid, and prisms at the first meeting concluded that the teacher had a mathematical knowledge related to finding the surface area of cube and cuboid was very good, teachers in managing learning experience many obstacles and difficulties, teachers in understanding difficulties, errors, and misconceptions of students is very lacking. At the second meeting the teacher had the mathematical knowledge related to finding the surface area of prisms was good, but needed to be improved. Teacher is very good at managing learning, and knowing the difficulties, errors, and misconceptions of students, but need to be improved as well.

[990]

Designing PISA-like mathematics problem using context of Karawang

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Abstract. The ability of mathematics always get attention to continue to be improved. However, the results of the assessment of the mathematical literacy on PISA conducted from 2000 to 2015 show that Indonesian students occupied the 10th lowest rank of participating countries in PISA. So, it needs the efforts to change, one of it is introducing mathematical problems of the PISA like to the students. The purpose of this research was to generate PISA-like mathematics problems using the context of Karawang which is valid. This research used research design research method with the type of research development or development studies and the evaluation flow used is formative study, formative study, including self evaluation, expert reviews and field test. The discussion of this articles is expert revies phase and one-to-one. Subjects in this study were three students of junior high school in Karawang district. The data collection techniques in this study were (1) walkthrough, this was based on expert review to obtain the valid PISA like problems in content, construction, and language aspects and (2) interviews, it used one to one. Once collected, the data were analyzed by used descriptive analysis methods via walkthrough analysis based on expert comments in expert reviews to obtain the valid PISA like problems. Based on expert reviews and student answers, it obtained the valid PISA like mathematics problems using context of Karawang.

[991]

Analysis of external factors affecting students achievement student of mathematics education of Samudra University

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Abstract. This study are the results of the study used in the third semester students and V Mathematics Education FKIP Samudra University academic year 2016/2017. Data collection used was questionnaire/questionnaire and interview. Approach and concept in this research using variable annotation with SPSS version 21. Interpretation of result of factor rotation indicates the formation of 3 factors together (main factor). The first to the third external factors that ranked first in the factors that are developing the results of the study of mathematics students FKIP Samudra University in sequence is the community environment, school buildings, and campus environment.

[993]

Association of mathematical concept understanding and mathematical reasoning: analysis of models DNR-based instructions

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Abstract. The mathematical concept understanding is an essential competency of mathematics learning. While the mathematical reasoning is the competency to understand mathematics. Based on this definitions, this study aims to describe the college students mathematical concept understanding and mathematical reasoning ability and to determine whether or not there is an association between the conceptual understanding and mathematical reasoning of college students who obtained learning DNR (Duality Necessity Repeated reasoning)-Based Instruction. The subject of this research is a pre-service teacher of primary school education department 2nd semester two who contract the subject of Basic Mathematics Concept II which is consist of 107 people. Given four problem about two linear equations, which include the indicator of understanding of concepts and mathematical reasoning. This data was analyzed with Spearman nonparametric test. The instrument test used has been validated by four expert validator. The result shows that there is a strong and positive association between the ability of mathematical concept understanding and mathematical reasoning.

[995]
Realistic mathematics learning based on the Bengkulu ethnomathematics to increase cognitive level

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Abstract. The purpose of this study is to decrypt the increase of the cognitive level of high school students through the application of realistic mathematics learning model based on Bengkulu ethnomathematics. This study is an assessment phase of development research (by Plomp [1]), with a 2x2 factorial experimental design. The result of this study was the ability of students' mathematical understanding to be taught with realistic mathematics learning approaches is higher than students who are taught by conventional learning approach for students who are given mathematics-oriented materials of ethnomathematics after controlled by students' initial ability. The ability of students' mathematical understanding to be taught by realistic mathematics learning approach is lower than students who are taught by conventional learning approach for students who are given mathematics materials are not ethnomatmatically oriented after being controlled with the students' initial ability. The ability of mathematical understanding of students who are given maths-oriented materials of ethnomathematics is higher than students who are given non-ethnomathematics oriented mathematics materials for students who are taught realistic mathematics learning approach after controlled by students' initial ability. The mathematical understanding of students who are given ethnomathematics oriented math materials is lower than students who are given non-ethnomathematics mathematics-oriented materials for students who are taught using a conventional learning approach after being controlled with the student's initial ability.

[996]
Fauzi's cognitive conflict in the development of geometry teaching material: A case study in shifting trapezoidal definition

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Abstract. From junior high school age, students have been taught about a trapezoidal definition. It is a quadrilateral which has exactly a pair of parallel sides. This definition is remain of a special meaning, for instance if it finds any rectangle which has a pair of parallel sides, then this quadrilateral can not be categorized as trapezoid. When students are asked to define trapezium in general in higher education classes such as at university level, students will experience a cognitive conflicts. This fact was discovered when researchers developed geometry textbooks aimed at improving students' critical thinking skills. In the implementation phase of textbooks that were tested in geometry class of Unesa mathematics department, found one student who experienced a cognitive conflict.

[1003]

The Analysis of senior high school students' mathematical abstraction ability profile based on local cultural wisdom

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Abstract. Mathematical abstraction needs to be developed in mathematical learning because it used in daily life. For example, pengeret-eret ornaments derived from Tanah Karo culture are composite of a parallelogram resembling the image of a lizard that has two heads. This study was the first phase to develop mean-ends analysis model local culture-based to improve students' mathematical communication and abstraction ability. The purpose of this study is to know the mathematical abstraction ability profile of junior high school students at grade VII. The data were obtained from observation, interview, and mathematical abstraction ability test from two regencies in North Sumatera, i.e. Tanah Karo and Mandailing Natal. The subject consisted of 119 students at grade VII from Karo tribe and Mandailing tribe. The result of this study showed that 5 (4,21%) students cannot bring up the abstraction process in solving problem. There were 56 students (47,05%) have noticed attention to the characteristics of the observed object but they did not see the relationship between the observed object. Furthermore, there were 58 (48,74%) students have noticed the characteristics of the observed object but to solve the problem students have not done the actions that will be done on the object to be manipulated.

[1008]

The development of learning tools using Treffinger learning model to improve the mathematical creative thinking

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Abstract. The mathematical creative thinking is essential for students. The initial test indicated that students' creative thinking ability is still lacking. Treffinger learning model deals with creativity problems. Based on the needs analysis, Treffinger learning instruments was not available nor any other creative learning model. This study aimed to develop and produce a valid and practical learning instruments using Treffinger learning model to improve the junior high school students' mathematical creative thinking ability. This was a developmental research that refers to the ADDIE development model. The results of this study indicated that the learning instruments satisfy the validity requirements and the results of the validity test by validators showed that instruments were valid and based on the agreement among validators results classified as the good category. Its practicality can be seen from the results of the learning implementation (93%). In addition, the results of teacher response analysis were classified as 'very good'.

[1009]
The implementation of the environment-based learning approach at the elementary school

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Abstract. This study aims to investigate the impact of the implementation of the environment-based learning approach on the number sense ability of students of the first grade at the elementary school. Students comes from three different areas of geographic topologies that illustrates the areas of Riau Province, which are the palm plantation, the coast and the river stream. The research design was Pre and Posttest Group Design with the sample consisting of two elementary schools that represent each area and the number of students are 125 students. The research data were collected with the test and analyzed by the descriptive and inferential statistics with the test of two difference means. According to the data analysis, it resulted that (1) there is the improvement in the number sense ability of students for each region with a varied percentage; (2) from overall students, there is the improvement in the number sense ability of students with the significant level of 14.9% after giving the treatment. Based on both results, it can be concluded that the implementation of the environment-based learning approach contributes significantly to the improvement of the number sense ability.

[1010]
Describing taxonomy of reflective thinking in solving mathematical problem: A case study of female-field dependent (FD) prospective teacher

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Abstract. Nowadays, reflective thinking is one of the important things which become a concern in learning mathematics. In learning mathematics, reflective thinking is one way to solve mathematical problem because it can improve student's curiosity when student faced a mathematical problem. Reflective thinking also is a future competence that should be taught to students to face the challenges and to respond of demands of the 21st century. One of reflective thinking models is taxonomy of reflective thinking which aims to see someone with a reflective thinking skill by checking, evaluating or testing the truth of a task or solving a problem which someone has done. Subject, in this research paper, is student who has cognitive style Field Dependent and enrolled as a student in Department of Mathematics Education. The purpose of this study is to analyze the ability of prospective teachers' mathematical problem solving based on taxonomy of reflective thinking. To achieve these objectives used a qualitative approach to describe in depth related problem-solving of prospective teachers who can be seen from the behavior of students in completing the tasks assigned by the taxonomy of reflective thinking. This research paper describes aspect of taxonomy reflective thinking in solving contextual mathematical problem involved solution by using some mathematical concept, namely linear program and algebra arithmetic operation. There are six characteristics to analyze data related to the taxonomy of reflective thinking in solving mathematical problems; (1) remembering, (2) understanding (3) applying, (4) analyzing, (5) evaluating and (6) creating.

[1011]

Effectiveness of development of animated inquiry-assisted learning model to improve the achievement of student chemistry learning in psychomotoric sphere

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Abstract. This research is motivated by not yet optimal role in learning chemistry and students are still difficult to distinguish chemicals that become macroscopic, microscopic and symbolic. It becomes a problem for the students and assumed to be not achieving students psychomotor supply is still low. The purpose of this research is to produce a valid animated learning model that is effective for improving students' chemistry learning in the psychomotor realm. Design of this research is research and development (Research and Development) by using model of ADDIE. The product trial was conducted in two schools, SMA Negeri 2 Padangsidimpuan and SMA Negeri 5 Padangsidimpuan were selected to be one experimental class and one control class. Instruments used and tests. To guarantee the validity of the product validation done by experts and FGD. The result of the research is a valid animated assisted inquiry learning model and also see one of the developed products. Effective animated assisted inquiry learning model to improve students' chemistry learning achievement in the psychomotor realm.

[1012]

Metacognition students in mathematical problem solving through ethnomathematics Rejang Lebong

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Abstract. This study aimed to describe the students' metacognition in problem-solving oriented learning mathematics through ethnomathematics Rejang Lebong. This study is the beginning of the research & development (Plomp [22]). Empirical study through interviews with six (6) junior high school students Curup Rejang Lebong about metacognition, problem solving and understanding of mathematical concepts with the starting-point custom home culture Rejang Lebong. Data were analyzed qualitatively. The results showed that students can develop the ability to solve the problem through self-reflection about the planning, monitoring and evaluating the implementation of the thinking process. Students can combine snippets of information about the parts of the traditional house Rejang Lebong resulting in principle wake up the room like a pyramid, prism, beams and cubes. Students can produce general principles of integrated data that can be applied to new situations based begun-wake there.

[1013]
The development of PISA type question contextualized to the local culture for junior high school Students in Padangsidimpuan

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Abstract. The Literacy of junior high school students in Indonesia is still low especially in Padangsidimpuan that can be seen from implementation of OM-BL (Literacy Based Mathematics Olympiad) 2017 on March 16th, 2017. Therefore, it is important to develop question that can measure the ability and the most appropriate technique is the PISA type question that is contextualized to the local culture, The development of this PISA Type's Question is important because it can be make students more productive. Departing from the phenomenon, the specific target that want to be achieved is to contribute thoughts on how to create a valid and practical PISA type question to measure the ability of mathematical communication. Thus, with the PISA type question that is contextualized to the local culture, student will be helped in sharpening their ability of communication and used to answer the questions of PISA type that is included to the category of higher order thinking. The method that is used is the research of 4-D model development that consist of 4 development phase, that is define, design, develop, and disseminate. And the final phase is to make a report about the question that have been developed and how the measurement results of students' mathematical communication.

[1014]
Students' metacognitive capability in lesson study for learning community (LSLC)-based mathematics learning with problem solving model

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Abstract. This research aimed at analyzing students' metacognitive skill through the application of learning journal in students' worksheet through LSLC-based learning with problem solving model on students of grade eleven. Mixed method (a combination of qualitative and quantitative analyses) was utilized in this research. The test results of metacognitive capability were then analyzed with the independent t-test. The research results showed that the significance (1-tailed) of the independent sample t-test was 0.000 or ≤0.05 proving that the implementation of LSLC-based learning with problem solving model significantly affected grade XI students' metacognitive capability when learning matrix, Metacognition can be established when students undergo problem solving, work in a small group through collaboration in a community which care for and learn with one another in form of Lesson Study for Learning Community (LSLC).

[1015]
Students' perceptions on the implementation of e-learning: Helpful or unhelpful?

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Abstract. This article reports a design research conducted to develop an e-learning web-based module at the Primary Education Department of Syiah Kuala University in Indonesia. The study employed the Four-D Model of instructional development which consisted of Define, Design, Develop, and Disseminate. This article focuses on the Develop stage where the users' perception was assessed regarding the implementation of the module. A number of 19 third semester students participated in the study. The data was collected using a questionnaire and interview. The questionnaire was constructed based on the technology acceptance model (TAM) which suggested that two factors influencing someone's acceptance of technology were: 1) perceived usefulness, and 2) perceived ease of use. The result showed that the students perceived the e-learning web-based module to be useful in improving their understanding, independence and self-discipline, motivation to learn, and interactions with each other and with the teacher. The students also agreed that the e-learning web-based module was easy to use. This study implies that the inclusion of technology in education at the university is beneficial.

[1016]
Characteristic of pre-service teachers' performance of problem posing at assessment course

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Abstract. This study aims to describe the characteristics of prospective students' performance in the problem posing for learning mathematics in the course of assessment. This is a descriptive research. The research subjects are 34 students of mathematics pre-service teachers in 2017/2018 academic year. Research Instruments used are (a) Validation Sheet, (b) Problem Posing Sheet. Data collection was conducted by test method. The research result showed that the students prefer the problem posing for the type of within solution, they prefer to make free essays problems than the structured essay ones, only view students make open problems. The languages used are good or quite good. All problems made can be resolved, Level of difficulty of the problems they made are high with dominated by analyzing problem, medium, or low with dominance of understanding problem, almost all students of pre-service teachers can solve the problems they made. When it was viewed from the type of problems created, the ability of students in asking questions with the type of post solution is the lowest, and the type of within solution is the highest ability.

[1018]
The development of higher order thinking skills instrument of the grade VIII junior high school

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Abstract. 21st century learning activities require learners to have high order thinking skills including critical and creative thinking skills, requiring high-level mathematical thinking skills tools to train and improve high-order thinking skills in mathematics. This study aims to produce products in the form of a high level of mathematics thinking skill instrument of class VIII junior high school based on Bloom's Taxonomy containing questions of type C4 (Analyze), C5 (Evaluate), and C6 (Creating). Indicators of high-order thinking include analyzing the outlined in organizing, differentiating, and linking. Evaluating is judging, checking and criticizing. While creating explained in generalizing, designing, and producing. This research was conducted at 115 junior high school of Jakarta consisting of 41 students, 19 junior high school of Jakarta consisting of 36 students, and 131 junior high school of Jakarta consisting of 36 students. The sample used is class VIII even semester of the year 2017-2018. Technique of collecting data using high grade thinking skill test of VIII SMP class then analyzed data with calculation of validity, reliability, difficulty, and distinguishing power. The results of the data obtained that the valid instrument reliable instrument and has a moderate degree of difficulty and distinguishing power.

[1019]
Development of mathematics learning tool approach contextual teaching learning (CTL) oriented character education

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Abstract. Implementation of the learning of mathematics, especially in SMP experiencing problems, one of which is the lack of learning tools that link the subject matter with the context of the daily life of students. Besides the lack of attention to aspects of learning tools that students' character development. This study aims to develop the mathematics learning approach Contextual Teaching Learning (CTL) is a valid character education-oriented and practical. Subjects in this study were students of class VII SMPN 1 Syamtalira North Aceh. Methods of data collection is done through expert validation sheet, achievement test, teacher assessment questionnaire, student questionnaire responses. Validation by experts found that the RPP, student books, students' worksheet (LKS), and achievement test has a very valid criteria, while the books teachers have valid criteria. The results of teacher assessment of the enforceability of learning have either category. Students' response to the device and learning implementation, 93% of students said he was happy, and 88% said learning device is new.

[1021]
The implementation of student worksheets based guided inquiry and its effect on students generic science skills

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Abstract. The purpose of this study was to investigate the influence of implementing student worksheets based guided inquiry on the generic skills of science learners. The approach used is experiment using one group pretest- post test design. The sample consisted of 30 students of XI- MIPA 4 SMAN 3 Banda Aceh and 32 students of XI-IPA 2 SMA Inshafuddin. The data were collected through generic science skill observation sheets and learning result tests. The results showed that generic science skills of SMAN 3 Banda Aceh were more developed on direct observation indicators, indirect observation, logical consistency and logical inference. SMA Inshafuddin were more developed direct observation indicator, logical consistency, and logical inference with good category. The learning outcomes obtained in both schools has N-Gain with medium criterion and t-test results significantly different. Therefore, student worksheet can be used as an alternative teaching material on acid-base material practice.

[1022]
Creativity development of students' ability by problem based learning model on equality and inequality of absolute value

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Abstract. Lack of opportunities for students to express ideas during the learning process makes students having difficulty in solving their daily life problems. Realizing the importance of mathematical creative thinking ability, thus it required effort to develop learning tool through Problem Based Learning (PBL) model. Learning tool was developed by expert validation. This study aimed to determine the development of students' mathematical creative thinking ability through PBL model for three meetings. Data was collected by using mathematical creative thinking test instrument and analyzed descriptively. The results showed that there was development of students' mathematical creative thinking ability taught by using PBL model.

[1023]
Student's understanding of numbers through the number sense strategy

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Abstract. Many students have difficulties to do arithmetic operations with fraction. One way to overcome student difficulties is to implement number sense strategy. Therefore, it is necessary to develop learning instrument consist of Lesson Plan, Worksheet, Test. This study only discuss about student understanding after implementation of number sense strategy. The participants are 19 students year 7 in one of secondary school in Meurah Mulia, North Aceh, Indonesia. Test used in this study are number sense problems and unstructured interview guidelines. The tests were conducted before and after the lesson. The result of the research shows that the students' understanding of the numbers has increased.

[1024]
Students' learning outcome and motivation on trigonometry through the application of discovery learning model using macromedia flash

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Abstract. One of the learning models suggested in the 2013 curriculum was discovery learning. Discovery learning model has a characteristic putting more emphasis on the discovery of concepts or principles previously unknown to the students. This study was aimed to determine student learning outcomes and the significant relationship between learning motivation and student learning outcomes are taught using a discovery learning model using macromedia flash. This research was a quantitative research with one-shot case study design. The data collection using test and non-test instruments. The collected data were analysed using the t-test and Person Product Moment correlation test. The results showed that the learning outcomes of students taught by using the discovery learning model with macromedia flash exceeded the value of KKM with an average score of 80.5 and there was a significant relationship between learning motivation and student learning outcomes where the value of correlation coefficient (rxy) of 0.8817 and the level of correlation relationship between the two variables was very strong.

[1025]
The teachers' ability in mathematical literacy for solving uncertainty problems on PISA adaptation test

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Abstract. This study aims were to describe the teachers' solution on PISA adaptation tests. The steps that researchers did in this research were (1) creating test questions by adjusting the existing PISA problem to the Indonesian context, (2) validating the test, (3) administering the test to the teachers, and (4) describing the teachers' test solution. There were four areas which were the scope of PISA mathematics tests, namely quantity, space and shape, change and relationship, and uncertainty. This test contained 13 questions, namely: (1) four questions for quantity, (2) two questions for uncertainty, (3) three questions for change and relationship, and (4) four questions for space and shape,. This research used 7 Junior High School teachers as subject research. This research was a design research which developed by Cobb and Koeno. All teachers answer correctly at the uncertainty area on the level 2 and level 4.

[1026]
Initial validation of prototype instrument for implementing higher order thinking learning using the improve method

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Abstract. This study aimed to produce a valid, practical and effective prototype of Higher Order Thinking (HOT) learning using IMPROVE method. This study employed the Research and Development approach using ADDIE model (Analysis, Design, Development, Implementation and Evaluation). Unitial stage of the developing the prototype was conducted avtivities of analysis, design and development of instrument as well as revision. Next activity was validation of prototype instrument by experts. Based on the validator's opinion, it was indicated that the prototype of higher order thinking learning using IMPROVE method was valid. It is concluded that the prototype were ready to be piloted in the partner schools to examine its practicality and effectiveness.

[1027]
Development of learning tool with contextual teaching and learning (CTL) approach to improve student mathematical connection ability

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Abstract. The ability of mathematical connections must be possessed by students when studying mathematics, but, in fact, the ability of students' mathematical connections is still very limited. Students are only able to connect between mathematical topics. Therefore, it is necessary to improve the ability of students' mathematical connections. One way to improve students' mathematical connection ability is through learning with Contextual Teaching and Learning (CTL) approach. The purpose of this study is to produce learning tools with CTL approach to improve students' mathematical connection capabilities that are valid, practical, and effective. This research is a development research that make use of Thiagarajan or 4-D model. The experiment of this research was conducted at a high school on one VII class consisting of 35 students to see students' mathematical connection ability. Learning tools that were developed in this research were lesson plan (RPP), student worksheet (LKS), and test of student's mathematical connection ability. The development of learning tools was done through expert validation. The validation and revision process was carried out until the learning tools were declared eligible for use in the learning activities. The results showed that the learning tool with CTL approach by using 4-D development model had been able to be used with little revision, which means that the tools had fulfilled the validity criteria. Therefore, teachers are expected to use learning tools with CTL approach that has been developed, so that the mathematical connection ability of students in the future will be better.

[1029]
Development of Calculus II texbook to improve the ability of mathematical problem solving

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Abstract. This study aims to determine the validity, practicality and effectiveness of calculus II textbook. The type of research used is development research using 4-D development model. The stages of this research are defined, designed, developed and disseminated. Tests conducted on *Institut Pendidikan Tapanuli Selatan* students. The results of this study indicate: 1) Validity of calculus II textbook is valid; 2) Practicality of calculus II textbook is practically used. This is obtained from the analysis of student response data on the textbook that students give a positive response; 3) effectiveness of calculus II textbook is effectively used. This is seen from the results of students' math problem solving skills test after the learning using this textbook is mastered because ≥ 80% of the test subjects meet the learning competences and the positive activity of the students.

[1031]
Estimation of return period of destructive earthquake in Aceh areas using Maximum Likelihood method

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Abstract. Aceh Province is one of the areas in Sumatra Island that coincides with the meeting of the Eurasian plate and the Indo-Australian plate. The negative impact of the plate meeting is the occurrence of an earthquake. The earthquakes that occurred in this region have caused various losses including casualties. Therefore, estimates of earthquake events are required for disaster mitigation caused by earthquakes. In this research the period of earthquake re-occurring in Aceh and Surrounding region using the relation between frequency and magnitude of earthquake known as Gutenberg-Richter relationship. The maximum likelihood method is used to determine the seismic parameters obtained from the relationship. The data used are sourced from the USGS earthquake catalog (1907-2008) and the BMKG earthquake catalog (2009-2017) with minimum depth is 80 Km that coincides at 92 ° - 98.5 ° East Longitude and 0 ° - 8 ° North latitude. The obtained magnitude data is converted to the moment magnitude (Mw), then selected data that have a minimum Magnitude (Mw) of 5 which is a destructive earthquake. The results obtained from this study are the period of the destructive earthquake (Mw ≥ 5) is expected to re-occur in 19.7 years in the sea region between Aceh Barat Daya and Simeulue.

[1032]
Design learning in mathematics education: Engaging early childhoods in geometrical activities to enhance geometry and spatial reasoning

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Abstract. Understanding Geometry and spatial reasoning is an important area of mathematics learning. In addition, especially for early childhood, geometry and spatial reasoning form the foundation of much learning of mathematics and other subjects. Unfortunately, these aspects are often ignored or minimized in early education and in the professional development of early childhood teachers. This case may be due to a lack of activities which involve students to reason about geometric phenomena in their surrounding world. Therefore, this study aimed to design an instructional activity to guide the early childhood in understanding Geometry and spatial reasoning by doing some activities related to shape. To achieve these aims, this study using design research (Akker et al model), where the research include three phases preparing for the experiment, Experiment in the classroom, and Retrospective analysis. This discussion focuses only Retrospective analysis to explain the role of learning trajectory developed towards the understanding of both geometric and spatial abilities. The study involved 13 children ages 5-6 in kindergarten TK Al-Washliyah Alue Naga Banda Aceh. Teaching experiment results showed that the learning trajectory that was developed hold the potentials to make a significant different in the geometry learning of early childhood and help children in developing their understanding about geometry and spatial reasoning.

[1034]

Optimization of learning result and student learning activities in Madrasah Aliyah Ulumul Qur'an Banda Aceh city using Open Ended learning model

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Abstract. The aim of this research is to know the optimum of learning result improvement and physics learning activity of XI-MIA class of Madrasah Aliyah Ulumul Qur'an Banda Aceh City on Newton's law concerning gravity using open-ended learning model. Aliyah Ulumul Qur'an of Banda Aceh City, amounting to 29 students, while the object is using open ended learning model on Newton's law subject of gravity. Techniques used to collect data is a matter of tests, student activity observation sheets, student response questionnaires and documentation. The data obtained during this research is processed using descriptive and quantitative statistics. Based on the result of research and data analysis, (1) the increase of the percentage of RPP implementation of open ended learning model from every cycle with very good category, (2) student learning activity is categorized very good, (3) student learning outcomes in first cycle categorize less good, the second cycle is categorized well but not yet completed classically, whereas in the third cycle the learning outcomes are very good and achieve mastery in classical, (4) student response to learning process is positive and categorize very good. Based on these findings it can be concluded that the results of learning and physics learning activities of students in the class XI-MIA Madrasah Aliyah Ulumul Qur'an Banda Aceh on Newton's law on the subject of gravity using open ended learning model is categorized very well.

[1035]

Playing of patterns to early childhood children design research: Teaching of math to early childhood education

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Abstract. Learning for early childhood should be done through play because the world of children is a world of play. Children learn through play, so the game needs to be packed in such a way that learning can develop the optimaly potential of children. One aspect that must be developed is the cognitive aspect. Especially for this research focused on the field of mathematics is the ability of children to recognize the pattern. The purpose of this study was to develop some models of playing of pattern for children aged 4-6 years. The study was conducted in three stages, namely designing, developing, and evaluating learning. The study was conducted for 6 months in TK IT Azkia Cadek Aceh Besar. The result showed that playing pattern model for children aged 4-6 years in the form of shape pattern, color pattern, size pattern, and number pattern. Proposed activities are organizing objects, coloring, sticking, and meronce. The types of playing of patterns that developed are repeating patterns, growing patterns, and symmetrical patterns

[1036]

The validation of training module to enhance mathematics teacher content knowledge

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Abstract. Based on the results of focus group discussion with mathematics teachers, principals, mathematics supervisors and representatives of the education office, it is found that the teachers have difficulty in understanding and teaching several mathematics materials. As a result, students have low score at mathematics test, while teachers mostly did not pass the competency tests. The purpose of this study was to develop six mathematics-training modules that is valid and practical related to the content knowledge of mathematics teachers. The research and development approach of Borg and Gall model in ten phases was used in this study. However, the development in this research was conducted only up to the eighth phase. The results showed that six mathematics-training modules had the valid and practical criteria. The validity was viewed based on the suitability of material and concept for mathematics with teachers' problems. The practice criteria were based on the conformity of the training implementation and the model designed, it is also viewed in term of efficiency, usage and attractiveness as the design consisting of images and usage guidelines completed with the allocated time..

[1037]

Developing mathematics teaching tool using ELPSA to construct students' mathematical understanding

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Abstract. This study aims to measure the validity, practicality, and effectiveness of a teaching tools designed to address students' mathematical understanding in the classroom. It recommends the use of ELPSA to construct students' mathematical understanding, and then offers the understanding into levels of disciplinary understanding framework. This paper discuss effectiveness only. Five components of ELPSA; Experience, Language, Picture, Symbol, and Application, are proposed proposed to give teachers and students a more tangible way to construct the levels of mathematical understanding and learning experience.. This teaching tool encourages students and teachers to construct their learning experience. Four-D model (define, design, develop, and disseminate) by Thiagarajan, Semmel, and Semmel used as developmental approach in this study. This study shown that teaching tools designed are valid, practical, and effective to be used to construct five levels of mathematical understanding; content, concept, problem solving, epistemic, and inquiry level.in mathematics classroom.

[1038]
Questioning skill of science teacher from students perspective in high school

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Abstract. One of the most important emphases in the 2013 curriculum is to produce graduates with high-level thinking skills. Implicitly, this proves that high school graduates so far have not had or still lack high-level thinking skills. Some theoretical studies show that high-level thinking skills, such as students' creativity in thinking students can be awakened by teachers who have good inquiry skills. It is therefore necessary to develop an instrument to measure. This study aims to describe the activities of the questioning skills of physics teacher based on developed instruments. This research uses qualitative and quantitative approach with survey technique. The research sample used were 6 physics teachers from 6 high schools in Kota Banda Aceh who were chosen based on their working period. The data collection instruments consist of teacher demographic questionnaires, self-description questionnaires, student response questionnaires and observation sheets. The test results show that the instruments have good reliability and validity values (0.90 and 0.25). The results of data analysis with descriptive statistics indicate that the skills of asking teachers on physics learning include enough categories. Then most teachers ask questions using redirecting techniques. Based on the result of this research, it is suggested to increase the questioning skill in physics learning, teachers need to do the spread of the question evenly, and the question asked must be trace using probing technique.

[1039]
Ability of mathematical critical thinking of secondary school students in solving mathematical problems reviewed from gender

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Abstract. Critical thinking skills include one of the highest-order thinking skills that is essentially a problem-solving skill. One of the competencies in the curriculum of 2013 is to develop creativity, curiosity, the ability to formulate questions to form critical thinking that is necessary for intelligent life and lifelong learning. It is therefore necessary to develop an instrument to measure students' mathematical critical thinking skills based on developed instruments. This study aims to describe the ability of mathematical critical thinking of secondary school students in solving mathematical problems in terms of sex based on developed instruments. The subjects were 4 students selected from 30 students of grade IX in one school in Banda Aceh. The instruments used in this study are critical thinking skills and interview guidance.. The results showed that the critical thinking ability of female students was slightly better than that of male students. In the interpretation indicator, the inference and explanation of the male and female subjects were able to meet all the aspects measured, whereas in the indicators of analysis and evaluation, the male subject was not able to use the correct calculations in solving the problem.

[1040]
Teacher's perception on teaching mathematical modeling: An exploratory study

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Abstract. The paper presents a description of school mathematics teacher perception towards teaching mathematical modeling. A Survey method was used to collect research data. In this survey, 57 school mathematics teachers from excellent accredited Schools in Palembang were involved in filling survey questions. The teachers consist of 38 junior high school teachers and 19 senior high school teachers. This survey ends up to a profile of school mathematics teacher's perception on teaching mathematical modeling in Palembang.

[1041]
Implementation of demonstration method and quantity pocket media to improve the learning result of addition matter and reduction of three numbers in class III elementary school

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Abstract. This study aims to describe the improvement of learning outcomes, teacher and student activities and student responses on the material addition and reduction of three numbers by using methods of demonstration and media pockets in the third grade of elementary school. The data source is 18 students of the third grade of elementary school. Data collected through tests, observations, and interviews. Data is processed qualitatively. The results showed that learning by using the method of demonstration and pocket number media can improve learning outcomes. The result of study of third grade students of elementary school obtained in cycle I 52,63% increase in cycle II become 88,88%. Teacher activity in cycle I obtained an average percentage score of 82.60 % increase in cycle II to 89.38%. While student activity in cycle I get average score percentage 80,64% increase in cycle II become 85,63%. Based on the results of the interview students feel happy to learn by using the media pockets of numbers, because the media pockets of numbers demonstrating the material directly in the teaching of teachers easier to understand students and students will remember longer about what they have learned.

[1043]
Development of student activity sheet based on ICT on FRACTIONAL NUMBERS

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Abstract. Technology is growing rapidly in this digital era. Children are familiar with computers, Android phones, and social media. Mathematics learning is generally considered indifferent to children because it is considered less fun. One of the mathematical material that is considered not to be mastered by children is the matter of fractions. Fraction numbers have been taught in primary school. However, it is not uncommon to find that there are still high school kids or even college students who have not been able to solve problems related to fractions. In fact, mathematical material, especially fractions, can be taught by associating it with ICT so that children feel more enjoyable learning. The research aims to produced student worksheet based on contextual about fraction numbers material which validity and practically in VII class SMP Negeri 2 Langsa. The type research is development 4-D model using which are divided into four stage, namely define, design, develop, and disseminate stage. In this research stage of the study was limited until develop stage is validity and practicalities. The research instruments are (1) validation sheet, (2) practicalities questionnaire, (3) interview guide. The student worksheet validity test by validator showed that student worksheet was very valid 88,01%, the practicalities test by teacher showed that student worksheet was very practical is 92.25% and the practicalities students test showed that student worksheet was very practical is 90.80%. These can be concluded that student worksheet based on ICT about fractions number developed very valid and very practical.

[1045]
The development of algebraic teaching materials to cultivate creative thinking skills of students in Higher Education

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Abstract. The purpose of this research is to develop algebraic teaching materials to cultivate students' creative thinking skills at the universities that are valid, practical and effective. The development model used is the development model of Plomp (2010) is used in this study which consists of several stages, namely: (1) validation by experts, (2) validation by practitioners, and (3) field trials. Based on validators' result algebra material obtained by valid category, while the result of observation of implementation test including practical and effective category. All indicators namely learning mastery, student activity, and student response meet the criteria set.

[1047]
Thesis components analysis of biology education program students in University of Negeri Padang

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Abstract. The purpose of this study is to determine the percentage and criteria of comprehensiveness, the order suitability of components written in the thesis, and the conformity of concepts on the thesis of components produced by students of Biology Education in the UNP, based on the Guidebook of the thesis writing of FMIPA UNP. The population are the thesis those produced by students in Biology Education UNP completed in 2013, 2014 and 2015 and the sample are selected by using disproportionate stratified random sampling technique. The type of thesis analyzed can be differentiated based on the research types: descriptive, experiments, and research and development (R & D) research. Data Analyzed by using the percentage formula on each category and the examination of the data validity is done by triangulation technique. The conclusion of this research are the criteria of the component's comprehensiveness of the thesis is very good, the criterion of suitability thesis's components order is good, and the concepts of conformity on the thesis's components is very good.

[1048]
Development of trigonometry textbook to improve student's mathematics problem solving skills

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Abstract. This study aims to determine the validity, practicality and effectiveness of textbook trigonometry. The type of research used is development research using modification of 4-D development model . The stages of this research are defined, design, development and disseminate. Tests conducted on students of SMA Negeri 1 Padangsidimpuan. The results of this study indicate: 1) Validity of trigonometry textbook is valid; 2) Practicality of trigonometry textbook is practically to be used. This is obtained from the analysis of student response data on trigonometry textbook that students provide a positive response; 3) The effectiveness of trigonometry textbook is effectively to be used. This can be seen from the results of students' mathematics problem solving test after the learning using this trigonometry textbook is mastered $\geq 80\%$ of the test subjects fulfill the learning competences and the positive activity of the students.

[1050]
The effectiveness of cooperative learning model type of reciprocal teaching mathematical communication skills

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Abstract. This research aims to look the effectiveness of Cooperative Learning Model type of Reciprocal Teaching mathematical communication skills of class IX SMP 4 Takengon. This type of research is qualitative descriptive. The population in this research is the entire class IX students on SMP 4 Takengon, the sample used 28 obtained performance of students in a class on the class management of Reciprocal Teaching of 80,6% with good categories, based on the results of the study experimental class of 28 students as many as 25 students (89,2%) has been completed in accordance with standard learning KKM in SMP 4 Takengon and as many as 3 students are not completely in the study because its value below 75. The response of the students towards learning with Reciprocal Teaching meets the criteria of the effectiveness when 80% or more of the total response of students achieve the category of positive or very positive. So, there is the effectiveness of mathematical communication skills of students who are taught using Cooperative Learning Model type of Reciprocal Teaching at class IX SMP 4 Takengon

[1051]
STEM learning in regular and vocational high schools on the topic of scientific menu card fabrication

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Abstract. This study was initiated by developing STEM worksheet and subsequently tested the effectiveness for regular and vocational high school students. The worksheet was previously developed with R & D method following STEM syntax on the topic of scientific-menu-card fabrication. The STEM project related to student's innovation on fabricating of scientific menu card that containing nutritional data and the efficacy of fruit juice beverage. Students respond to STEM learning process were collected based on product assessment sheets, and questionnaire. The vocational students have higher score in design card which general high school students were better in menu card presentation. There was not significantly different score among students except on indicator of motivation to accomplish the project, entrepreneurship motivation and vision broadening. Vocational students have better responds on these indicators. STEM worksheet was recommended by students & teachers to use as an alternative teaching material in entrepreneurial learning.

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[1052]
Developing guided-inquiry-student worksheets to improve the science process skills of high school students on the heat concept

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Abstract. Conventional student worksheets applied in schools had not been effectively improve the student creativity because the students were not trained science process skills in most lab practical activities. Practical works were only confirmation of lab procedure. The purpose of this research is to compose guide inquiry based student worksheets using R & D methods with ADDIE model. The validated students worksheet was implemented at regular senior high school in Banda Aceh (SMAN 4 Banda Aceh) by randomly sample the class from five parallel classes. After implementation, a test for basic science process skills was performed by students and students' respond were collected by using questioners. The finding showed that is the student process skills were significantly improved after the guided inquiry learning was implemented by using the effective student worksheet. Most students recommended the guide inquiry students worksheet to apply in other classes because easy to understand, contextual and motivating students to do science investigation.

[1053]
Development of learning resources through benthic species study in mangrove ecosystem Reuleung Leupung in invertebrata zoology learning process

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Abstract. This study aimed to (1) develop learning resources through studying benthic species of mangrove ecosystem in Reuleung Leupung in the learning of Invertebrate Zoology, and (2) analyze the composition of benthic species in used as learning resources for Invertebrate Zoology subject in Biology Education major. The study was conducted in Reuleung Leupung mangrove ecosystem of Aceh Besar district on July to September 2017. Benthos data collection was conducted in Reuleung river bed, Leupung, and data collection of benthos used in Invertebrate Zoology subject was conducted in Biology Education department of Faculty of Teacher Training and Education Syiah Kuala University and in Biology Education department of Tarbiyah and Teacher Training Faculty of Islamic Public University Ar-Raniry Banda Aceh. Data analysis of benthic species as learning resource was conducted using the percentage formula, while benthic dominance level was analyzed using the dominance formula. The result showed that (1) the number of each species benthic used in Invertebrate Zoology learning ranged between 3.13% to 93.75%, and (2) the composition usage of each species in Invertebrate Zoology subject ranged between 0.03 to 0.94. The conclusion obtained were (1) the highest percentage of benthos used in Invertebrate Zoology learning in Syiah Kuala University and Islamic Public University Ar-Raniry was mollusk from Gastropod class; and another one was the crustacea from Malacostraca class, (2) Benthos composition of mangrove ecosystem Reuleung Leupung, Aceh Besar district used as learning resources in Invertebrate Zoology learning ranged from high to low.

[1054]
The mathematics application in making of portable biogas device for student in laboratory education

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Abstract. The mathematics has very important role in making portable biogas device which able to use for student in laboratory education It is needed to calculate the volume, the ratio of gas and liquid applied and etc. The design and application of portable biogas technology is done by mathematic calculation and trial and error using the materials used drum, oil, cow dung, plastic hoses, simple pressure control and using ballast pendulum. The basic design for the manufacture of portable biogas devices is based on research conducted by EPA USA. In the study the maximum solids content in slurry was 12.5 percent. However, based on experience of using local cattle, the content of solids in slurry is used 50%. This can be made by mixing 1 part of cow dung with 1 part water or one bucket of cow dung with 1 bucket of water. The slurry volume is 75% the volume of the main tank. The volume of the remaining main tank (25% volume) is used for gas reservoirs and to facilitate gas distribution. Slurry retained in the tank for 20 - 30 days according to HRT (Hydrostatic Retention time).

[1055]
The ethnomathematics study: Exploration of Gayo tribe local wisdom related to mathematics education to extend Islamic character

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Abstract. The aim of the study is to investigate (1) the sort of Gayo tribe local wisdom related to ethnomatemathics, (2) the islamic character found on Gayo tribe local wisdom related to ethnomatemathics. The results of the investigation will be used to develop ideas of mathematics learning integrating the gayo tribe local wisdom and islamic character. The sampling technique is snow-ball sampling which are used 3 types of techniques. Those are setting, source and method. The research instrument is used semi-structured which refers on four questions Where to look, How to look, What it is, and What It means. The data analysis follows Miles and Huberman concepts. The local wisdom of Gayo tribe which is related to mathemathic for (1) measuring Kal, Bambu or Are, Kaleng or Tem, Naleh, Kunce, Padang, Gateng,(2) Geometry obtained from Kerawang (Gayo traditional cloth) motives, such as Matahari (Matanelo), pucuk rebung, Puter tali, Emun berkune, Pagar (peger), emun berangkat, Rante (rantai), Emun beriring dan cucuk pengong.. The implication of the study related to the gayo tribe local wisdom and islamic characteristics obtained towards the mathematics learning.

[1056]
Developing learning trajectory based instruction of the congruence using Lawang Sewu context

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Abstract. This research aims to produce a Learning Trajectory Based Instrucsion (LTBI) that can help students understand the concept congruenceof two dimensional shape using the context of Lawang Sewu in grade IX. LTBI is defined as a teaching and learning trajectory that used HLT for instructional decisions.The type of the research used by the researcher in this study is the design research developed by Gravemeijer and Cobb,that consist of three phases, namely (1) the preliminary design, (2) design of the experiment (pilot experiment and teaching experiment), and (3) the retrospective analysis. In this study, a series of learning activities designed and developed based on the approach of Realistic Mathematics Education or in Indonesian version is PMRI. This research produced Learning Trajectory Based Instruction that consist of a series of learning process in three activities, namely identifying and finding the properties of congruence shapes by watching Lawang Sewu vidoe, proofing two congruence shape with transformation (translation and rotation), and solving problem related to congruence of two dimensional shape. From the activity being performed can help to improve the understanding of the students in the material of congruence. The researcher' exposure in this paper is limited to the first stage of the design research developed by Gravemeijer and Cobb namely preliminary design.

[1057]
The potential of Jangka beaches as a natural laboratory for learning the concept of biodiversity

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Abstract. Utilizing the surrounding environment as a laboratory will be more impressive for passive learners to be active in learning, the self-reliant is also able to bring up creative ideas and ideas. This study aimed to analyze the ecological criteria that include bird species diversity, richness of flora and fauna found in the area and the response of teachers to the suitability Jangka coastal areas as a natural laboratory. Data collection for the diversity of bird species was conducted using observation line transect techniques. Line transect used for bird watching at the time of transfer from one point arithmetic to calculate the next point. The data have been analyzed using the formula Shannon-Weaver diversity index. The results showed the number of bird species found as many as 45 species of birds from 21 families. Bird diversity index is = 3.6913. Data collection for the wealth of flora and fauna was conducted by observation. The data have been analyzed using percentages. The percentage obtained for the rich flora and fauna, which is 62%. The conclusion of this study is that there are bird diversity in the area of Jangka Beach Alue Ue is high with = 3.6913 and for the wealth of flora and fauna are also included in the high category with the percentage obtained by up to 62%. The survey results revealed that the majority (83%) of teachers answer (YES) for a potential term coastal areas as a natural laboratory for materials biodiversity. While the teacher's response stating (NO) is obtained (17%).

[1058]

Realistic mathematics education based on Acehnese culture: One way to improve problem solving ability of elementary school students

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Abstract. Many students in Aceh were not used to non-routine problems in mathematics and generally had low ability in mathematical problem solving. This study aimed at investigating the improvement of students' problem solving ability after applying Realistic Mathematics Education (RME) teaching approach based on Acehnese culture. It is a quasi-experimental study involving two groups of fifth grade students as the research samples. Tests of mathematical problem solving were developed as the research instrument to measure the improvement of students' problem solving ability. The reliability value of 0.93 was obtained which showed the tests were reliable to measure the students' problem solving ability. Since the assumptions of normal distribution and homogeneity of variances of the data were met, t-test was used to test the mean difference between the two groups. Based on the analysis results, it was concluded that at level of significance $\alpha = 0.05$, students who received the Acehnese culture based RME approach had a better improvement in problem solving ability compared to those who received conventional approach.

[1059]

Generative learning model to improve mathematics problem solving skills on polyhedron

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Abstract. The purpose of this study was to develop valid, practical and effective generative learning instruments to improve the mathematics problem solving skills. This research was a development research using Thiagarajan, Semmel & Semmel's 4D model consisting of designing, defining, developing, and disseminating stages. However, this study was limited to the validation stage. The instruments developed were lesson plan, student worksheet, and mathematics problem solving test. Data collection techniques used were questionnaires, and tests. The participants are 24 year 8 students in one of secondary school in Pidie, Aceh, Indonesia. The validity data of learning instruments were obtained based on expert validation while the validity data of the test were obtained based on students' answers. The results of this study showed that the learning instruments developed was valid, with the score for (a) lesson plan was 4.54 (excellent category), (b) student worksheet was 4.32 (good category), and (c) the test of mathematics problem solving skills was 4.4 (good category). Furthermore, the developed test of mathematics problems solving skills showed that the average results of validity and reliability were categorized into the high criteria, difficulty index into medium criteria and differentiation index into good criteria.

[1061]

The development of a module with microsoft excel-based interactive media on the topic of buffer solution

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Abstract. Materials discussing Buffer Solution are considered complicated and abstract because they include the three levels called the macroscopic, the microscopic and the symbolic levels. Several studies have shown that interactive simulations using computer technology could help learners to understand abstract concepts. In this research, a module with Microsoft Excel-based interactive media was developed as an alternative to real lab practice on the topic of Buffer Solution. The method used in this research was Research and Development method with ADDIE model. The effectiveness of this media was tested with the second graders of natural science program of a senior high school as the samples with a direct experiment and a response questionnaire regarding the developed media. The samples were chosen randomly. Based on the results of the research, it was indicated that the module with Microsoft Excel-based interactive media received positive responses from the teachers (88%) and the students (86%). The results suggest that the improvement of the students' conceptual understanding was in high category (N-gain = 0,98) and the improvement of their analytical thinking skills was in intermediate category (N-gain = 0,5).

[1062]

Reading to learn statistics in college: How learning materials should be designed

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Abstract. The evolving nature of statistics implies the skill of reading to learn statistics essential for college students. In order to encourage the skill, proper designed learning materials are required. This article aimed to synthesize the suggestions from the current empirical research in statistics education relevant to designing statistics learning materials for college students. Cognitive and social cognitive learning perspectives were used in reviewing and synthesizing the research, which may reveal the different concerns for a specific situation. Three key suggestions were identified, i.e., using real life data, familiar contexts, and interactive materials. The reviews also suggested the urgent need for research focusing on designing learning materials for statistics.

[1063]
Development of algebra assessment items based on Bloom's taxonomy

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Abstract. It is widely found that most of Algebra test items at level C1 to C4 of Bloom' taxonomy. Therefore, it is very rare that C5 and C6 questions are available in textbooks. This study aims to develop Algebra test items for C5 and C6 level of the taxonomy. This study employed Plomp's design research model. However, it is important to highlight that this paper only reports the vaidation phase of the study which is analysis of the validity of C5 and C6 Algebra test items.Responses and feedback from four validators are analyzed descriptively and reported in this paper. The findings show that the items test were valid and standardized at the cognitive level of C5 and C6. According feedbacks from validators, we revised the items. Finally, it can be concluded that the items satisfy criteria of C5 and C6 with validity score of 4.7.

[1064]
An analysis of questions made by mathematics teachers of senior high school / Islamic senior high school in Pidie district

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Abstract. The evaluation of education is the activity or process of determining the value of education, so that it is able to know the quality or the results. Education involves learners, teachers, methods, objectives, curriculum, media, means, principals, government, society, graduate users, the physical environment, human beings and so on. Therefore, the evaluation of education is done on the components of education. Comprehensive evaluation provides complete information as a basis for improvement in education. The purpose of this research was to know the quality of mathematics questions made by mathematics teacher in terms of taxonomy bloom. This research was conducted at SMA which has implemented the 2013 curriculum and Madrasah Aliyah (Islamic Senior High School) in Pidie District. The subjects were mathematics teachers consisting of five high school teachers and three Islamic Senior High School teachers who taught in third grade. The subjects were taken with consideration through purposive sampling. The results showed that mathematics questions made by teachers were still not well- scattered yet in the six taxonomy bloom. In general the problem was still at the level of understanding (10%), application (56%), and level of analysis (34%). It can be concluded that mathematics questions made by teachers in general were still in the category of Lower Order Thinking Skills.

[1065]
Applications of Microsoft Excel as interactive learning media acid-base titration

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Abstract. The purpose of this study is to create an interactive Microsoft Excel-based learning program on the subject of acid-base titration. This research method is Research and Development. This research was conducted in SMA Negeri 2 Banda Aceh. The subjects of the study were students of class XI. The methods used in data collection are interviews, questionnaires and tests. The method of data analysis is by quantitative descriptive analysis technique. Validation results from media experts and material experts are 79.41% and 77.94%, respectively, with very good category. The result of field test is known to the students' experimental class science skill better than the control class with the significant difference.

[1066]
The effectiveness of Autograph assisted problem based learning model for improving high school students' learning outcome on graphic functions materials

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Abstract. Learning outcomes are obtained after the learning process occurred and they act as information for teachers regarding the students' mastery of learning objectives. Students' learning outcomes can be developed through chart-making tasks which are in relation to images in their daily life. If the graph is manually painted the students will have difficulty and therefore need to be assisted with Autograph software through PBL model. The type of this research is development research. This study adopted Plomp's method which consists of three phases: (1) preliminary research (2) prototyping phase, and (3) assessment phase. This study only discussed the assessment phase that was obtained from field trials to determine the effectiveness of Problem-Based Learning model assisted by Autograph. Participants of this study were 17 students of class X from one high school in Banda Aceh. Data were collected through student's worksheet and questionnaire and analysed d descriptively. The results of the data analysis showed that 88% of students achieve learning objectives and 90% of students had positive responses toward the learning.

[1067]
Development of student worksheet based on metacognitive approach to improve students' mathematical representation ability

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Abstract. This research aims to develop and produce student worksheet which valid, practical, and effective based on metacognitive approach at one-variable linear equation and linear inequality topic on year 7. This development research uses 4-D model (Define, Design, Development, and Disseminate). This research was conducted at one secondary school in Pekanbaru, Indonesia. The research subject was year 7-students on 3 of 5 classes that homogeneous. Data collection instrument were questionnaires and mathematical representation ability test. Data were analyzed using descriptive statictical analysis technique. The result showed that student worksheet based on metacognitive approach were stated very valid with the validity rate is 81.71%, very practical with the practicality rate is 82.30%, and very effective with the effectiveness rate is 83.33%. This research produced the student workshop which valid, practical, and effective.

[1068]
A self-evaluation technique in improving teacher's professional development: The use of "realia" media and "wait time" strategies

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Abstract. Personal teaching evaluation is an influential way to improve teacher's professional development and student achievement. The anatomy of a blue crab was selected as the topic in this study. The purpose of these topics was to enrich the use of "realia" media in teaching science for elementary school students (by pre-service teachers whom were enrolling to this course at University of Arkansas) that are based on common things found in daily life or around us (such as home yard, grocery stores, or parks). The teaching performances have been analyzed qualitatively using the modification of Florida Teacher Performance Measurement system. Students' perceptions (n=32) as feedbacks for teacher teaching practice was also used as extra information for this personal evaluation task. The result showed a positive response on the topic and class activity that have designed using the realia media. In addition, related to the wait time strategy, the wait time should have been implemented to show a sign of the willingness to give elaboration answer (more responses or more explanation for questions). Based on the evaluation, it could be concluded that being confident (relate to self-efficacy) was essential to support teaching activities such as showing enthusiasm, respecting the students, and other positive attitudes. Preparing a preserved specimen of a blue crab can be an alternative way to prevent fear and unpleasant scent in observing a blue crab for early grade school students.

[1069]
Developing a learning trajectory for teaching statistics

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Abstract. This paper aimed at developing a learning trajectory (LT) for teaching statistics using Realistic Mathematics Education (RME) approach and investigating it's influence on students' statistical reasoning ability. The LT was developed through a design research that consisted of a cyclic process of preparing for the experiment, conducting the experiment, and retrospective analysis. The research's subjects were 30 students at grade 9 MTsN Salido, Indonesia. Data were collected trough observations, interviews, checklist, videotaping, and analyzing the students' works. The LT was validated by three experts in mathematics education and one expert in instructional design and it met the criteria of validity (relevance and consistence). The LT was evaluated trough one-to- one and small group evaluation before it was tried out in a field test and it met the criteria of practicality. The whole strategy (emergent model) were found and discussed students, showing how the construction or the contribution of students in discovering the concept of statistics from the formal to the informal level. The results showed It could help the students to reinvent statistical concepts such as mode, mean, median, quartile, and deviation standard. Finally, we discovered the growth in the students' statistical reasoning.

[1070]
The ability of solving the mathematic problems through realistic mathematics education based learning trajectory

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Abstract. This study aimed at implementing the Realistic Mathematics Education (RME) topics sequences and series-based learning trajectory to improve the students' ability of solving the mathematical problems. The given learning trajectory encompassed the real problems that assisted the students to follow the math process of building the students' knowledge in solving the mathematical problems. This descriptive qualitative research was conducted in class IXd SMP Negeri 1 Telukdalam. The techniques of collecting the data were test and interview. The data reduction, data presentation, and conclusion were ways of analyzing the data. The results showed that there was an improvement in the students' math problem-solving abilities after using the RME-based learning trajectory. As a proof, the mean score of the students' problem-solving ability prior to the action was 48.41, whereas, after the action, the mean score was 74.85. In conclusion, the RME-based learning trajectory could enhance the students' math problem-solving ability.

[1071]
Use of wxMaxima linear algebra module on gauss elimination lesson for mathematic education students

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Abstract. Students' difficulties on solving problems in Linear Algebra courses could be assisted with Use use of wxMaxima Linear Algebra Modules. Learning Linear Algebra using the wxMaxima Linear Algebra Module was conducted in seven meetings. The wxMaxima Linear Algebra Module has been developed using the ADDIE development model. This paper focuses on Gauss Ellimination lesson which is one of the lessons in linear algebra courses by using the wxMaxima Linear Algebra Module. The test subjects were 17 students of Mathematics Education of UIN Ar-Raniry. The research instruments were self-lecturer' reflection sheet and RPS relevance sheet with learning implementation. The learning process lasted for 150 minutes using the Direct Instruction model. The learning activities were begun with Elementary Row Operations (ERO) and Gauss Ellimination (GE) explanation explained by lecturer and followed by manual problem solving using paper pencil method. Furthermore, the solution of the problems obtained manually were checked with wxMaxima software. Learning activities were continued with the concept of Gauss Jordan Elimination method. Although the student took a long time to work manually on the Gauss Ellimination problem, but the overall planned time allocation at the lesson plan could be met well. Linear algebra course lecturer could expand the use of the module for another linear algebra lesson.

[1072]
The quality of mathematic learning instrument using modification of Think Pair Share (TPS) model

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Abstract. Think Pair Share (TPS) modification learning model is expected be able to strengthen TPS model syntax by changing many group members from two members become three members. The researcher has developed mathematic learning instrument by using TPS Model Modification. The development of TPS Learning model modification instrument is conducted through development research of Plomp Model. This paper focused on learning instrument quality that its practicability criteria become the assessment phase of Plomp Model. The instrument practicability is evaluated by using the recommendation of experts and teachers to the application of learning instrument. The data was obtained from the trial test of learning solving 19 participants of the students from class IX-A of SMP IT Al-Fityan School Aceh. The research instrument used is the observation sheet of learning implementation. The research results showed that learning instrument using TPS Model Modification has met the criteria of the practice; the experts recommended that the learning instrument using TPS Model Modification can be applied in the classroom. Moreover, the teachers also mentioned that the instrument developed can be applied in the learning process in the classroom. Then, the level of instrument application developed include in very high category.

[1073]
Equivalent proportion learning through realistic mathematics education approach using the context of timpan recipes in junior high school

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Abstract. Each mathematics material requires a learning trajectories that is in line with the characteristics of the material and the students. The purpose of this study is to describe the learning activities of Comparative Values through Realistic Mathematics Education Approach implemented at the Hypothetical Learning Trajectory (HLT) trial which has been developed. HLT was developed using an appropriate context to the characteristics of students in Aceh, namely a timpan recipe. The HLT development of equivalent proportion material was carried out by employing Design Research limited to two stages of preparation and trial learning. HLT trial of equivalent proportion with the context of the timpan recipe involved 20 Year 8 students of one of the junior high schools in Banda Aceh. Data of learning activities were obtained through student activity observation sheet, student observation sheet, and field notes.The data were also obtained from the recording of teacher learning videos during the classroom test. The results showed that the students were actively involved during the HLT of equivalent proportion examination with the context of the timpan recipe. This was indicated by the students' activities started from paying attention to the problems provided by the teacher, the students' responses to the given problems and the students' strategy in solving the problems related to equivalent proportion as well as students' interaction.

[1074]
Android based e-learning tutorial for mathematics teacher

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Abstract. The large number of teachers and the scattered location due to geography condition is one of the causes the slow process of teacher training in Indonesia. The current national curriculum (Kurikulum-13) had been launched in 2013 but the implementation of the curriculum has the problem in socialization as well as teacher training in using this curriculum. This development research produces android based E-tutorial material of the K-13 Curriculum Implementation for Mathematics Subjects that can be used by Mathematics teachers. The product contain of the curriculum K-13, the Competency analysis, design Lesson Plan and design Evaluation for the knowledge and skills aspect as well as video using scientific approach in Problem Based Learning and of Discovery Learning Model. This e-tutorial is developed by using Waterfall Method and used android based. The product has been used by Mathematics teacher for testing product practicality. The product is assessed based on aspect of cosmetics and program. The product then revised based on input from the teacher. The average score on program aspect is 3.8 and 3.5 on aspect of cosmetics. Therefore, the results of this study will be one of the solutions for preparing teacher in implementing the curriculum.

[1081]
The Development of teaching material: Rigorous mathematical thinking in geometry class

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Abstract. This study aims to develop a teaching material with *Rigorous Mathematical Thinking* (RMT) approach. It had been constructed by considering some activities such as problem solving, problem posing, open-ended problem, connection problem, conjecture, creativity task, mini lab, and drawing skill. A textbook had been chosen to develop because of necessity reason. The subject in this study was undergraduate mathematics student in the University of Wijaya Kusuma Surabaya. They were a candidate of mathematics teacher which had been chosen as one class who took a geometry subject. The textbook had been developed based on Mediated Learning Experience and Rigorous Mathematical Thinking. It had been constructed by Plomp's Research Design model which consists of three phases: preliminary research, prototyping phase, and assessment phase. There were some criteria used to validate the teaching material and five experts had been chosen as validator. Furthermore, this paper will focus on the validation process of textbook. Students have been mediated to construct their understanding by using mental operation. One important task about creative thinking which includes in this book is about trapezium definition. Students are ordered to build new definition of trapezium which is different from the preceding definition they had in senior high school. The development of student book which uses Rigorous Mathematical Thinking approach is valid

[1082]
The quality of vector analysis module assisted by wxMaxima software

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Abstract. Abstract. Teachers, as an educator, should have the competence in applying Information and Computer Technology ICT in the learning process. To prepare the competent educators mastering ICT, lecturer should also conduct the lecture activities utilizing ICT. One of the ICT application includes the use of learning software such as wxMaxima. Thus, the module using wxMaxima software needs to be developed. This research aimed to develop a valid module. This research used the Plomp development model consisting of three phases, namely preliminary research, prototyping and assessment. The preliminary research phase consisted of analysis of curriculum, university condition, student characteristic, and need assessment. In the prototyping phase, the researcher carried out the initial prototype of vector analysis module using wxMaxima software. However, this research was conducted only for the prototyping phase. The Nieveen criteria was used for the validity, if the criteria of the content and construct validity were met, the product developed is valid. The data was analyzedby examining the average validity score of each validator. The data analysis results obtained from the vector analysis module using wxMaxima software developed was highly valid.

[1083]

Problem solving skills of junior high school students using open ended approach on the topic of rectangle

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Abstract. Mathematics is frightening for students. This is indicated by many complaints from mathematics teachers stating that students' mathematics problem solving skills are lacking. Thus, it is needed to develop learning materials to improve students' problem solving skills;one of them implement the open ended approach. This research aims to describe students' problem-solving skills based on the learning materials developed. The subjects were three Year 7 students who were high, medium, and low mathematics achieving students. Data collection was carried out using problem solving test and interview. The data was analysed using qualitative method. The results showed that the problem solving skills of high and medium achieving students met all problem-solving indicators on each given problem. Low achieving student can only solve three questions meeting the criteria of problem-solving indicators; the remaining two questions were missing and therefore they did not meet the problem-solving indicators.

[1084]

Deepening students understanding on triangle topic through 'application' component of ELPSA framework

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Abstract. ELPSA is a learning framework that was introduced as a sequence of a learning process which presents mathematical ideas through lived experience, mathematical conversation, visual stimuli, symbolic notation and the application of applied knowledge. Applying the "application" component of ELPSA (Experience, Language, Pictorial, Symbol and Application) framework in the mathematics classroom emphasizes how the understanding of certain material can be applied to a new situation. This study investigates the learning process during the class activity about triangle. The study was conducted in one of the junior high school in Central Lombok, West Nusa Tenggara. The result shows that the activity of composing a 2D shape from various types of triangle support students in deepening their understanding about the types of triangles. Also, the activity of composing 2D shape can be a promising foreground for students in their following learning about the area of the composite figure.

[1085]
Student ability in stating situations into mathematical models or drawing through problem solving approach

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Abstract. The Sstudents' mathematical communication skills need to be developed through appropriate instructional strategies, such as problem solving approach. One indicator of the ability of mathematical communication skill is the ability to state the situation into drawing. Quadrilaterals learning tool with problem solving approach to cultivate students' mathematical communication ability has been developed by using ADDIE development model. This article describes the development of students' ability to state the situation into drawing through learning with problem solving approach. Capability development data is obtained through experimental learning material that have been developed. The data is part of the quadrilateral learning device trials data with problem solving approach to cultivate the ability of mathematical communication. The test subject is six students of class VII-1 in one of the high schools in Aceh Besar. Subjects were selected for each of the two high, moderate, and low-ability students. The instruments used are mathematical communication ability test and semi structured interview sheet. The test results show that the ability to state the situation into the model / drawing with problem solving approach develops varies based on student ability. High-ability students can state the situation into the model / drawing at each meeting. Medium-ability students can state the situation into the model / drawing at the first meeting, but decreased at the second meeting and again increased in the next meeting. While low-ability students have not stated the situation into the model / drawing at the first and second meeting and can only state the situation into the model / drawing at the third meeting.

[1086]
Cognitive conflict strategy to minimize students' misconception on the topic of addition of algebraic expression

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Abstract. The students' misconception on the topic of algebra needs attention. The learning of cognitive conflict strategy is expected to minimize the student misconception. The learning instrument of algebra operation material using cognitive conflict strategy has been developed by using ADDIE development model. The learning instruments consist of RPP, LKS and diagnostic test. This paper explains the test output of addition and subtraction of algebraic expression based on the instruments developed. The addition and subtraction of algebraic expression become the initial material in the algebra operation. The subjects of this test were 20 students junior high school of Safinatussalamah in Lhokseumawe, Indonesia. The research instruments used were teacher self-reflection sheet and the relevance sheet between RPP and learning implementation. Research output showed that the test conducted meets the initial planning which was 90 minutes. Learning activity was started by motivating the students through the problems related to the daily activities. Then, students conducted cognitive conflict test, presented the working result, and discussed with the other students and teacher in deciding the correct answer as the result of the presentation activity. In this phase, teacher ensured that the students' concept met the scientific concept. Next step, the students wrote the self-reflection to find out the difference between the initial concept and the new concept. In the end of the learning activity, students did the personal exercises related to the material learned. Overall conceptual changes occurring are quite good, even though few students still faced misconception. However, it can be concluded that overall of the cognitive conflict learning strategy can minimize the students misconception on the topic of algebra.

[1104]
The students' thinking process in solving mathematical problems based on level of mathematical ability

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Abstract. Problem solving has become central in mathematics learning. But, there are still many students who have difficulties in answering questions in the form of problems. Revealing the thinking process of students in problem solving is something very important to know. This is because in answering questions in the form of problems also involves high level of thinking or high order thinking which is one of the goals of learning mathematics in Indonesia. This study was aimed to describe the thinking process of students in solving mathematical problems. Thus, the type of research was descriptive with qualitative approach. The sSubjects of this study were students of Forestry Faculty of Agriculture Studies Program in one of the universities in Aceh. Checking the validity of the data was done by using triangulation technique, in this case triangulation method. The supporting instruments in this research were math problem solving task, and interview guidance. Analysis of research data using techniques presented by Miles and Huberman were data reduction, data presentation, and conclusion. Based on the results of the research, it showed that 1) Subject thinking process with high mathematical ability in solving mathematical problem was conceptual thinking, 2) Subject thinking process with mathematical ability in solving mathematical problem was semi-conceptual thinking, 3) Subject thinking process with low student ability in solving mathematical problems is thinking computationally.

[1105]
The quality of Islamic realistic math learning tools to increase mathematic communication level of participants in primary school

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Abstract. Learning mathematics aims to solve problems of students related to their daily life. They need a mathematical ability to solve their problems in mathematical communication. The ability of mathematical communication can be improved through realistic mathematics learning approach, where students are invited to learn actively in accordance with real problems (Wijaya, 2012). On the other hand, it has been emphasized that the educational process should not leave the characteristic of an area as a nation's wealth. One of the areas that have such uniqueness is the province of Aceh. The specificity of Aceh in question is the education system in accordance with Islamic Shari'a. Therefore, it is necessary to develop Islamic nuanced learning. One of the efforts is to develop a realistic learning tool of Islamic nuances. The stages in the development of this learning tool by applying the theory Plomp (2013) is the initial investigation, design and assessment. This article just only measure validity and practicality of the developed learning tools. The trial was conducted at SD IT Cendekia Darussalam District of Big Aceh. The subjects of the study are the students of grade V. Following the above steps, the learning tools are valid and practical. The resulted products are Learning Implementation Plan (LIP), Student Learning Worksheet (SLW) and Learning Results Test (LRT).

[1106]

An Analysis of Students' Creative Thinking Ability in Learning Mathematics through Learning Model of Logan Avenue Problem Solving (LAPS) – Heuristic

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Abstract. The students' mathematical creative thinking ability is still not as expected. Efforts to develop creative thinking skills are expected to be applied by learning mathematics through the learning model of LAPS-Heuristic. The learning tool used in LAPS-Heuristic model has been developed through the ADDIE development model. This paper focuses on the development of students' mathematical creative thinking skills through the LAPS-Heuristic model. It was obtained from the effectiveness test of the learning tools being developed. This effectiveness test was included in the implementation stages of the ADDIE development model. The test subjects were 30 students from grade 8 of Percontohan Junior High School, Banda Aceh. The results showed that the development of students' mathematical creative thinking abilities during learning through the LAPS-Heuristic model varied. It also showed that the indicator of fluency and flexibility decreased in the second meeting, but was followed by an increasing result in the subsequent meetings. The indicator of originality had an increasing result at the third meeting and remained the same for the following meeting. Meanwhile, the indicator of elaboration answer to math problem showed an increasing result in each meeting. Overall, the development of students' mathematical creative thinking ability could be developed by maximizing the heuristic questions that were posed to students.

[1107]

Reproductive learning with an integrative curriculum approach in High School

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Abstract. The education system in Aceh has not implemented the Qanun of Aceh's Education that integrating Islamic values in learning classroom. Integrative Curriculum (IC) is a workable approach to implemented Islamic values in learning Biology. Learning tool of Reproduction Material with IC approach has been developed by developer of Plomp development model. This paper describes the learning activities of reproduction topic with an IC approach based on experimental learning tools developed. The learning device has been declared valid based on experts and practitioners' recommendations. Trial is was done to see the implementation of the developed device. The implementation of the developed device is one indicator of the practicality of learning tools. This trial involved 28 students of class VIII SMP Negeri Indrapuri Aceh Besar. The instrument used is was the observation sheet of the implementation of learning with the IC approach. The results showed that the learning of reproduction topic with IC approach can could be implemented in class according to the learning device that has been developed. The learning process of reproduction topic integrates the Islamic values based on the verses of the Qur'an that describe the process of human creation, namely Qur'an Surat Al-Hajj verse 5, Group 2 Qur'an Surat Al-Mu'minuun

verses 12, 13 and 14, group 3 Qur ' an Surah Al-Mu'miin verse 67, and Group 4 Qur'an Surah Al-Qiyaamah verses 37-38.

[1108]
The effectiveness of STEM mentoring program in promoting interest towards STEM

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Abstract. STEM mentoring program were introduced in order to overcome the declining interest in STEM subjects in schools. This study aims to measure the effectiveness of STEM mentoring programs on the students' interest towards STEM. Comparisons between girls and boys on their interest towards STEM were also conducted. The STEM Mentoring programs in this study consisted of an array of the program from various faculties namely (i) BITARA STEM and STEM Career Interest from Faculty of Education (FPEND), (ii) CRYSTAL from Faculty of Engineering and Built Environment (FKAB), and (iii) Science Camp and SEE Nature from the Faculty of Science and Technology (FST). This study used post-test control group design involved 198 students in one of the states in Malaysia. Data garnered from the study was described by means of descriptive analysis, which later followed by inferential analysis using independent sample t-test. Overall, the findings revealed that there is significant difference between girls in treatment group in interest towards mathematics. This study showed that research should be done more thoroughly on mentoring program, need to find out the suitable framework in implementing STEM mentoring programs and possible implementation of Blended Mentor Mentee programs for further research to get a corroborative evidence.

[1109]
How do we let students work as 'young mathematicians' in the classroom?

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Abstract. We must encourage students to solve mathematical problems and — in my opinion, more importantly — to develop and justify mathematical theories. If that succeeds, mathematics becomes more than finding the right answer or repeating a teacher's argument. But how do you do that in the classroom? The problems we pose to students and the questions we ask largely determine the image of mathematics that students develop. If we constantly ask for the 'right' answer, students will think that mathematics is primarily a mathematical activity and that mathematical thinking stops when they have found the 'teacher's answer'. However, when we ask students to defend their approach and encourage students to generalize the strategy used, a different, richer picture of mathematics arises.

[1110]
Student's representation of fraction through ELPSA framework

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Abstract. Representation has an important role in developing students' mathematical ability. Therefore learning materials need to be developed. One of them by implementing Experience, Language, Pictorial, Symbol, and Application (ELPSA) Framework. Aim of this research is to analyze students' mathematical representation on Fractions material after implementing ELPSA framework. There were 20 year 7 students from one of the Junior High School in West Lombok, Indonesia who joined the lessons, 11 females and 9 males. However only 6 students were involved in interview section to investigate their answers about representation of fraction. This research shows that the students still have difficulties in representation of fraction. Students' representation on Fraction should be conducted continually and trough exercise. Errors in representation on fractional material also occur due to students' mistakes in understanding fraction unit.

[1111]
Teachers' use of learning resources in spatial learning

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Abstract. Pursuing capabilities in STEM (Science, Technology, Mathematics, and Engineering) needs spatial skills. However, previous studies indicated that students seem to have obstacles in learning Mathematics because of low spatial skills. One of strategies to enhance students' spatial skills is providing various learning resources. This study aimed at developing learning material using various learning resources to support students' learning of geometry. This study used Design Research method consisting of three phases namely preparation, teaching experiment, and retrospective analysis. However, this study will only focus on describing the differences and similarities of the intended and enacted learning performed by teachers in the teaching experiment phase. Two year 7 mathematics teachers from two public schools in Banda Aceh participated as subjects of this study. Data collected from video recording, field observation, and interviews were analyzed descriptively. The result showed that, even though the two teachers performed some differences in using the learning resources, they mostly used the learning resources as intended in the developed learning material. It is indicated that the learning material developed need further consideration so that teachers will use the learning resources as they were intended.

[1119]
The students' viewpoint in making a chart: The study of PISA's problem solving in data content

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Abstract. This study aims to analyze students' viewpoint in making a chart based on analysis of students' problem solving in PISA problems. This research was conducted on 50 students in grade VII from 3 different schools in Banda Aceh. From the four types of data presentation and interpretation, such as point chart, lines chart, bar chart, and pie chart, it was found that the student's' tendency to understand the problem was based on only one observational dimension. The students explanation that form presented remains focused only on x-axis or y-axis. This makes it difficult for students when presented data in bar charts, and increasingly difficult when presented data in pie charts. Basically,13-14 year old students, according to Piaget's cognitive development theory, is in the stage of development toward the formal, so that it is possible students probably still think of the concept from one point of view. Therefore, it is necessary for teachers to bridge the students' thinking from informal concept to formal concept. Through the results of this study, it is expected to provide a reference for education to develop learning.

[1123]
Investigating students' learning trajectory: A case on triangle

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Abstract. This study is part of a design research that investigates students' learning trajectory for the topic of the triangle. The study involved 22 students of 7th grade in Malang, Indonesia. Data were collected through a videotaped, a student's worksheet, and a classroom observation. The results showed that students discovered the requirement of forming a triangle given three side lengths. In this condition, the starting point of students' learning trajectory was drawing a line segment from the given 3 side lengths. Furthermore, students examined another two side lengths whether these side lengths can be joined to the line segment as a triangle or not. Students used rulers for determining those three side lengths that could form a triangle. They made a statement that the sum of any two sides of a triangle must be greater than the third side.

[1124]
The development of learning instrument using creative problem solving learning to improve creative thinking skills

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Abstract. Students are required to have creative thinking skills. The ability to think creatively is the thinking skills of students in solving mathematics problems using various alternative and new solutions. Students' creative thinking skills are lacking and less attention is paid for such skills in the implementation of mathematics learning, which resulted in students having difficulties in solving problems related to everyday life. One of the efforts to improve students' creative thinking skills is by applying Creative Problem Solving (CPS) learning model. The purpose of this research was to develop a valid and effective CPS learning instruments to improve the creative thinking skills. The development method used was Four-D Modified Models consisting of four stages: defining, designing, developing and disseminating, however, this research was only for the developing stage. The learning insruments developed were lesson plan, worksheet and Tests of creative thinking skills. These three instruments have been validated by four validators. Based on the results of the study, it is showed that the lesson plan was a highly valid category with an average score of 4.1 and can be used with minor revisions. In addition, the student worksheet was also highly valid with an average score of 4.4 and can be used with minor revisions. Furthermore, the test of creative thinking skills also feel into the highly valid category with an average score of 4.2 and can be used minor revision.

[1129]
Ethnomathematics analysis on Jambi plait art as the mathematics learning resource

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Abstract. This research is based on the fact that mathematics is considered difficult subject and most students have less understanding of mathematics. Meanwhile, culture is believed to be a good learning resource that can be used for teachers to teach effectively even for mathematics. Art and culture such as plaited mats and hat as the mathematics learning resource that make mathematics is easier and interesting. This paper is an early part of research development of instructional media using ADDIE model. This qualitative research aimed to understand and analysis the mathematics aspects on the Jambi plait art for mathematics learning as well as the connectivity of ethno mathematics and Jambi plait art so could be as mathematics learning resource. Research data is taken by observation, interview, and documentation technique of Jambi plait art product and Jambi plait artist. The result shows that there are three aspects of six aspects available of Jambi plait art that could be as math learning resource: counting, measuring, and explaining, on some topics as arithmetic (multiply two) or linier comparison, area and area around of flat plane, line pattern and sequence, geometric, and linier programming.

[1150]
Teachers' activities during designing Higher-Order Thinking Skills (HOTS) mathematical questions through teacher assisting program

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Abstract. An assistance for primary school teachers when designing mathematical questions would be crucial since many teachers were not yet able to develop mathematical questions that could train students to reach higher order thinking skills. This study aims to provide teachers with assistance in designing HOTS questions as a part of the development process of teaching instruments. This paper only explains teachers' activities during the assisting programs. The assisting programs were conducted for four meetings and involved 10 primary school teachers in Banda Aceh, Indonesia. The findings showed that teachers' activities during the first assisting program in designing HOTS questions were not as effective as had been intended, due to the lack of teachers' attention to the tutor's instructions during the program. Meanwhile, the second assisting program showed an effective result on all components of teachers' activities.

[1215]
Improving Calistung literacy using Lectora application

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Abstract. *Calistung* is an abbreviation in Indonesian Language that means reading, writing and counting. *Calistung* literacy is a basic on recognizing letter and number. Many expert states that *Calistung* literacy facilitates written communication using letter and number. This research is a development research that produced animation using *Lectora* application. The aim of this study is to improve students' literacy in *Calistung* using animation in the fourth grade in primary school. This learning model can be used practically, valid and effectively so the learning outcome can be reached optimally. The content expert scored the content 92.22%, which means the content is really good. The media expert scored the media 77.33%, which means the animation in this research is good. The software expert scored the software 80%, which means the software is good to be used in designing teaching material. Eighty percent of students state that the media is good to be used and 87% of teachers state the same.

[1216]
Integrating technology and media into mathematics learning

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Abstract. The purpose of this study was to determine the size of product validation that has been developed. The resulting product is interactive multimedia for learning mathematics at third class in elementary school. This development informed with the consideration that technology and learning media assist teachers in creating active, interesting, and meaningful learning. Its use in learning makes learning more effective. Validator consists of media experts, linguists, and learning material experts. The instrument used is a validated questionnaire for each expert. The data were analyzed quantitatively by descriptively. The results show that the media is valid regarding media (78%), linguistic (81%), and material (80%). Indicates that the multimedia of mathematics learning for elementary school is appropriate to be used and continued to the stage of practical assessment and effectiveness.

[1217]
Cartography in designing digital map using CS6

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Abstract. This study created an IT-based learning model in designing digital atlas for elementary students using Adobbe Flash CS6 on social science learning. The purpose of this media was to motivate the students to study social science well, anytime and anywhere without being limited by space and time. The reasons to choose Adobbe flash CS6 media in this research were because it is easy, interesting, update and can be animated. Through digital map media, it is expected that social science learning in elementary school will be more interesting and social science learning objectives can be achieved well. This research used development research method which included: analysis, design, and evaluation. The developing procedures for IT-based learning media were divided into three stages: analyzing social science curriculum for elementary school about natural appearance, then designing digital map media using CS 6 software, the final stage was validation process. It was obtained a criteria that stated good product and user effectiveness equal to 83, 5. Thus, the result showed that digital maps were appropriate to be used in social science lessons for elementary school students.

[1219]

Light Emitting Diode (LED) as an essential props component for stem education in the 21st century: A focus for secondary school level

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Abstract. The revision of secondary school curriculum is often late to follow the rapid development of technology. For instance, LED (Light Emitting Diode) technology is widely used in daily live, however it is rarely used as props for science in secondary education. This paper is intended to show the experience of the author in the use of LED as physics props during the workshop in Trieste, Italy and on community service activities implemented in Banda Aceh. The learning model used in the activities is based on ISLE (Investigative Science Learning Environment) for physics that were developed by Eugenia Etkina from Rutgers University and involving the subjects in STEM education. From our experience in implementing LED on a teacher training in Banda Aceh, it was found that most of the teachers are excited about the training that used LED as props and 89.4% of them feel that their knowledge increased. Even though LEDs are easily found in the market and the price is cheap but the components have not widely been used as props in high schools in Indonesia. Therefore, STEM Indonesia (STEM.id) will promote the use of LED as a props in high schools with ISLE based STEM approach which becomes one of the variations of instructions that will create the atmosphere of "learning is fun."

[1220]

Development of learning media based on isle-based STEM approach and its implementation on the grade 10th students of senior high school students in Banda Aceh

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Abstract. The Indonesian 2013 curriculum (K-13) demands a learning process for learners in a range of three domains, namely attitude, knowledge, and skills. One learning environment that supports the 2013 curriculum is the Investigative Science Learning Environment (ISLE)-based Science, Technology, Engineering, and Mathematics (STEM). The ISLE approach is a learning approach that encourages students to be active, creative and innovative in conducting observations and experimenting a project under study. The ISLE based STEM method can help to solve real problems (in Science) and involving collaborative group activities. The development of instructional media plays an important role in ISLE Based STEM approach. The purpose of this study are to develop the learning media of ISLE Based STEM, gathering the learners feedback and outcomes of learning from high school students grade 10th in Banda Aceh. This research is using the ADDIE (Analysis-Design-Develop-Implement-Evaluate) development model. The result of LKPD (Lembar Kerja Peserta Didik) validation analysis of LKPD validity expert reaches 3,93 which is a valid LKPD criterion that is feasible to be used in a learning process. While the test results from the learners achieved 80.83% after the ISLE- based STEM approach is implemented.

[1301]

Utilization of NI-Multisim software as a virtual laboratory in STEM-based physical experiments

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Abstract. The effectiveness of conventional laboratories in some secondary schools in Indonesia especially in Aceh is affected by inadequate infrastructure. This causes lab scheduling problems, which makes the laboratory learning experience is insufficient in meeting the need of students. One of a sensible solutions to overcome this problem is by utilizing virtual laboratory (virtual lab). Currently STEM Research Centre Unsyiah (SRCU) is promoting a fun learning by integrating Science, Technology, Engineering, and Mathematics in teaching and learning processes. This approach is known as STEM-based learning approach. SRCU tries to invite students to learn Sciences in an interactive way by utilising technology as a medium of learning. Through the STEM approach, students not only will memorize the theories, but also understand the concepts behind those theories and also their applications in everyday life. In this approach the students are not only learning concepts but also applying those concepts in experiments. The technology discussed in this paper is the use of virtual laboratories through the use of NI-Multisim software in conducting physics experiments.

[1302]
Assessing the validity and reliability of questionnaires on the implementation of Indonesian curriculum K-13 in STEM education

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Abstract. A forum group discussion (FGD) on the implementation of Indonesian Kurikulum 2013 (K-13) in STEM Education was held in March 2018 by STEM Unsyiah Research Center and attended by 60 science educators and educational policy makers. Survey instruments were developed to measure participants' understanding and opinions regarding the implementation of K-13 in STEM Education and how satisfied they are of the FGD. It was found that in the questionnaires on participants' satisfaction, eight items are valid with validity values range from 0.632 to 0.824, which are significant at 0.001 level. Two other items have validity value of 0.081 with p-value 0.665 and of 0.264 with p-value 0.144. For the questionnaires on the implementation of K-13, it was found 9 items are valid with validity values range from 0.584 to 0.821 that are significant at 0.001 level. Another item has validity value of 0.441 with p-value of 0.017. For internal consistency reliability, it was found that the Cronbach's alpha of the satisfaction survey is 0.838; meanwhile for the implementation of K-13 in STEM Education, the response data have Cronbach's alpha of 0.882. These results showed that the questionnaires were responded reliably by the respondents.

[1303]

Mathematics education and Asian games 2018 in Indonesia

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Abstract. In August 2018, Indonesia will host Asian Games in two cities, Jakarta and Palembang. As the researchers stay in the city of Palembang, we use this event as the context for designing mathematics lesson materials. This paper shares the results of the design research method which aims at developing Learning Trajectory for primary school students. Three phases of design research namely 1) Preparing for an experiment; 2) Teaching experiment; and finally 3) Retrospective analysis. As a result, this research produces Local Instructional Theory on fractions using contexts Asian Games 2018 sports namely swimming, shot put, rowing, running and hurdles. The swimming context could stimulate students' informal knowledge about the meaning of fractions. By using shot-put context can assist students in learning the subtraction of fractions. Running context can help students understand the division of fractions. Meanwhile, rowing context can help students understand addition and subtraction of fractions. And the context of hurdles can help students to realize their knowledge about the concept of multiplication of fractions with natural numbers. Therefore, it will contribute positively to the various parties on how to teach fractions using contexts in PMRI.

[1304]
Application of guided discovery methods on Pythagorean theorem

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Abstract: In the process of learning Mathematics students tend to memorize the concept of Mathematics. This may happen because the teacher is too dominant in teaching, so the involvement of learners in the learning process is very lack, which resulted students memorize a lot and cause less mastering of the subject matter. This research aims to describe the application of guided discovery learning that can improve the learning outcomes of mathematics at students grade VII SMP Negeri 9 Pematangsiantar. Research conducted two cycles, with cycles is: planning, doing, observation, reflection, revising, which is continued planning, doing, observation, reflection (revised) and then continually reconducted. Based on the learning outcomes of such learning planning: formulate the problem, analyzing data, prepare conjectures, and vervalize conjectures; obtained that the application of learning guided discovery can improve student learning outcomes of mathematics. Student learning outcomes increase, students are included in the "good" category and teacher activity results are included in the "excellent".

[1305]

Mentoring model to improve PCK (Pedagogical Content Knowledge) of mathematics teacher

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Abstract: This study aimed to examine the development of Pedagogical Content Knowledge (PCK) of mathematics teachers through mentoring model as the foundation to develop model to enhance the PCK of mathematics teachers. The research method employed was Research and Development model consisting of three stages: Preliminary research, prototyping and assessment phase. Mathematics teachers' initial ability of PCK analyzed in the preliminary research showed that teachers' PCK ability were lacking. This study only focused on the prototyping phase. The expected product of the study was the initial prototype to observe the development of PCK through mentoring program. The study showed that the prototype to observe the PCK ability of mathematics teachers utilizing the mentoring model was effectively used and teachers' PCK ability were improved.

[1306]
Integrating Science and Math

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Abstract. This research and development aim to produce teaching materials for improving the quality of science learning that integrated mathematics for students in PGSD Universitas Negeri Padang. The research method used is the ADDIE model. The research stages consist of (a) the stages of analysis conducted on the curriculum, the needs of the students and the lecturers' needs. (b) product design stage in the form of lecturing module, which is analyzed by an expert team. (c) Product stages consisting of several chapters that integrate science and mathematics (d) implementation stages are test stages, this stage was performed if the expert team has finished validating the teaching materials to be used in the review process and (e) the evaluation stage, i.e., looking back on whether all the stages have been properly implemented. The results showed that the teaching materials developed to improve the quality of learning with the average achievement of prices of 63.66 while the average posted the value of 75.10. Then the results of the observer assessment showed that 75% of students followed the course activities well.

[1307]
Integrated model in science for elementary school

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Abstract. The interaction of the integrated learning model used in science lessons in elementary school did not necessarily have an impact on the outcomes of elementary students. It means that learning with the integrated model was not focused on students who had high motivation alone, learners who had low motivation could also obtain high learning results. The purpose of this research is to reveal the effect of the integrated model used by students. This research methodology used experimental research. The amount of contribution of motivation in improving learners' learning outcomes could be seen on the average learning outcomes obtained by learners who had high motivation in the experimental class was 86.2, while the learning outcomes of low motivated learners were 78.9. In the control class who had high motivation was 74.8 and average learning outcomes of learners who had low motivation were 63.1.

[1308]

The effect of PMRI approach assisted media Adobe Flash CS6 to the result of mathematics learning

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Abstract. This research based on low cognitive learning outcomes of students and less interesting mathematics learning for students as the result of learning centred on teachers, and many teachers who have not used interesting media. This research aims to find out to what extend the influence of PMRI approach assisted media Adobe Flash CS6 to result of learning mathematics at Grade V. This is a quasi experiment research. It was conducted at SDN 2 Marapalam Padang City. It used purposive sampling, Grade Va as the control group and Grade Vb as the experimental group. The instrument used in this research is multiple-choice type. Inferential statistical test with t-testis used to analyse the data and it was found that the mean value of experimental group who applied PMRI approach with Adobe Flash CS6 media is 80,16 with standard deviation 13,15 and the control group using PMRI approach is 71,33 with standard deviation 13.13. Based on the hypothesis test, using t-test (t-test) on the real level $\alpha = 0.05$ obtained t count = 2.803 and t table = 2,000 so t hitung > t tabel maka hipotesis, H1 in this study was accepted and how as rejected. So it can be concluded that the PMRI approach media assisted Adobe Flash CS6 influences the results of mathematicslearning Grade V SDN 23 Marapalam, Padang City in the academic year of 2017/2018.

[1309]

Practicality of Quadratic Functional Learning Module by Utilizing Media Software Autograph Assisted Game Angry Birds

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Abstract. The utilization of learning media based on information technology and games is expected to help students understand the material of Square Function. The learning modules with information technology-based media are needed to enable teachers and students to achieve learning objectives. This paper describes the practicality of learning module of Quadratic Function Material which utilizes Autographic Software-assisted Game Angry Birds media. This research data is obtained from the results of experiments of learning devices Quadratic Functions through cooperative learning model called Numbered Heads Together (NHT) with Autograph Software and Angry Birds Game which previously been declared valid by experts and practitioners. The trials are conducted to measure the practicality and effectiveness of devices that have been developed with the Plomp development model. The test of learning device involves 30 students of class X MAN Model of Banda Aceh. The research instrument used is the research sheet of practicality of expert and observation sheet of implementation. The results of the experiment show that the quality of learning module of Quadratic Function Material utilizing instructional media of Autograph Software with Angry Birds Game has fulfilled the criteria of practicality, two of the three experts stated that learning device is considered practical. Furthermore, the level of implementation of the developed device include the very appropriate category.