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"Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk Pendidikan Indonesia Maju"

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"Transformasi Matematika dan Teknologi Menuju Generasi Matematika Unggul untuk Pendidikan Indonesia Maju"

Universitas Negeri Medan, 09 November 2023

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KATA PENGANTAR
KETUA PANITIA

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

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

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

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

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

Medan, November 2023
Ketua Panitia,

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

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

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

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

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

Medan, November 2023
Dekan

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

KATA PENGANTAR
KETUA JURUSAN MATEMATIKA
FMIPA UNIVERSITAS NEGERI MEDAN

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

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

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

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

Medan, November 2023

Ketua Jurusan Matematika

Dr. Pardomuan Sitompul, M.Si
NIP.196911261997021001

SUSUNAN ACARA

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

KEYNOTE SPEAKER

KEYNOTE SPEAKER 1

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

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

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

KEYNOTE SPEAKER 2

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

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

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

KEYNOTE SPEAKER 3

Ahmad Isnaini M.Pd.

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

Ahmad Isnaini juga telah mengukir prestasi gemilang dalam berbagai kompetisi dan olimpiade. Sebagai Finalis Apresiasi GTK 2023 BBGP Sumatera Utara Tingkat Provinsi dan penerima berbagai medali emas, perak, dan perunggu dalam Olimpiade Guru tingkat Nasional dan Provinsi, Ahmad Isnaini memperlihatkan dedikasinya dalam pengembangan kemampuan diri dan juga siswanya.

Tidak hanya aktif di dunia akademis, Ahmad Isnaini juga telah berkontribusi dalam literatur pendidikan. Karya-karyanya yang terpublikasi dalam jurnal nasional dan internasional, serta buku-buku seperti "Guru Merdeka" (2020) dan "Inovasi Pembelajaran" (2018), mencerminkan pemikiran dan wawasan yang mendalam dalam bidang Pendidikan.

DAFTAR ISI

INCREASED UNDERSTANDING OF MATHEMATICAL CONCEPTS AND MOTIVATION WITH A PROBLEM POSING APPROACH ON CLASS VIII MTs NEGERI 2 RANTAUPRAPAT

Miftahul Jannah[1*], Nurhasanah Siregar[2]

Jurusan Matematika, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Medan, Medan, Indonesia

* Corresponding Author : miftah_mft@mhs.unimed.ac.id

Abstract

This classroom action research is motivated by the low learning motivation and understanding mathematical concepts of student. This study aims to improve the ability to understand mathematical concepts and motivation by using the problem posing approach. The research subjects were 32 students of class VIII-A MTs Negeri 2 Rantauprapat. The research was conducted in 3 cycles where each cycle consisted of problem, planning, implementation, observation, data analysis, and reflection stages. Data collection techniques used in this study included tests and observations. Problem posing approach can improve understanding of mathematical concepts and motivation of class VIII-A students of MTs Negeri 2 Rantauprapat. This improvement was shown by the average motivation in pre-cycle (55.98%), cycle I (67.78%), cycle II (75.48%), cycle III (86.30%), and the average understanding of mathematical concepts in pre-cycle (24.58%), cycle I (41.67%), cycle II (69.01%), cycle III (90.89%). Because it has reached the motivational completeness criteria, namely the average student motivation reaches ≥ 75% and the completeness criteria for understanding mathematical concepts, namely 85% of students get scores ≥ KKM (75), then the research is said to be successful.

Keywords: *Motivation, Understanding of Mathematical Concepts, Problem Posing.*

1. INTRODUCTION

Mathematics is a matter that always lives at every tier of education. Mathematics lessons recreate an consequential part in all aspects of life. Kline (in Susilawati, 2020) states that mathematics is not an isolated expertness that can be ideal on its own, though the presence of mathematics is primarily to aid humans in comprehending and getting social, financial, and unpretending issues. Therefore, the development of mathematics never stops because it will continue to be needed in various aspects of human life.

Although knowledge of mathematics is needed in life, in reality, there are still many students who do not like mathematics. Mathematics is considered a tedious, complex, and scary subject. Many students do not have the motivation to learn and lack understanding in mathematics. As said by Santrock (2017) Motivation is an essential aspect of teaching and learning. Students who do not have motivation will not try hard to study. Highly motivated students enjoy going to school and absorbing the wisdom process. By having a good understanding of the concepts in mathematics, students are expected to have good solving skills, so that students can solve problems in mathematics and can apply their abilities to solve problems in everyday life (Zulkarnain & Budiman, 2019).

According to Robert M. Gagne (Nurdyansyah & Fahyuni, 2016) there are eight grades of the learning process, namely:

1. **Motivation**, the initial grade initiates learning with the incentive to carry act in reaching specific goals (intrinsic and extrinsic motivation).
2. **Understanding**, people obtain and comprehend the statement accepted from learning. Understanding is gained via attention.
3. **Acquisition**, the person offers intention / senses all the facts that reaches him so that the storage process appears in the student's memory.
4. **Withholding**, withholding statement/knowledge products so that they can be used for the long term. Long-term memory process.
5. **Recall**, re-issue statement that has been stored, when there is stimulation.
6. **Generalization**, employing wisdom products for specific goals.
7. **Treatment**, the embodiment of transitions in personal manners resulting from learning.
8. **Feedback**, people obtain feedback from the conduct that has been done.

Based on the explanation explained by Robert M. Gagne, learning mathematics needs to be based on motivation and also a good understanding of concepts. Meanwhile, according to NCTM (National Council of Teachers of Mathematics, 2000) understanding concepts is the primary basis for learning mathematics. In line with Santrock (2017) statement in his book entitled educational psychology, namely conceptual understanding is a key element of education. One of the important goals of pedagogy is to support students comprehend the primary visions in a subject, not specifically learn separated facts.

The scientists encountered that raising students' motivation comes from combining their learning occasions. The scientists claim that the attraction and motivation for learning a second discipline arise in connection with its intentional use when introducing the language content. In addition, motivation is provided through the dynamics of studies during which the materials are discussed. Thus, students become dynamic players in the process, so they are ready to learn (Vlasenko et al., 2020).

Mathematical understanding is more meaningful if it is built by the students themselves. To conduct a momentous understanding, knowledge mathematics must be directed at the ability to connect mathematics between manifold opinions, comprehend how mathematical statements are bonded to one another so that a thorough understanding is built, and utilize mathematics in contexts beyond of mathematics. Therefore, the capability to understand mathematical concepts is essential for students in learning mathematics. The material studied in mathematics is essential so students need special attention, high learning motivation and a good understanding of mathematical concepts to master. This shows that learners at the junior high school grade should own good knowledge to understand mathematical concepts.

Purwaningsih et al. (2017) Students are said to be able to understand concepts well if these students are able to achieve the indicators of understanding the concepts set. According to the regulation of the Director General of Elementary and Basic Education of the Ministry of National Education No 506/C/PP/2004 dated 11 November 2004, the indicators for understanding the mathematical concept are:

1. restating a concept;
2. classifying objects according to certain characteristics according to the concept;
3. give examples and non-examples of concepts;
4. presenting concepts in various forms of mathematical representation;
5. develop necessary or sufficient requirements of a concept;
6. use, utilize and select certain procedures or operations; and
7. Applying concepts or algorithms to problem solving.

According to (Santrock, 2017) quoted from Zack and Tversky reveals that concept definitions are categories that group objects, events, and characteristics based on common properties. In contrast to the definitions quoted from Hahn and Ramscar that concepts are elements of cognition that help simplify and summarize information. According to (Lestari, 2019) The ability to understand mathematics is the ability to absorb and understand mathematical ideas.In the 2013 Curriculum, one of the goals in learning

mathematics has been listed, namely mathematical concepts (Fadmawarni et al., 2020).

According to Bloom (Anderson, Lorin W. & Krathwohl, 2017) there are levels of cognitive thinking processes possessed by students which include remembering, understanding, applying, analyzing, evaluating, and creating. Cognitive domain in understanding the concept when students have reached C2, it means that students have mastered domains C1 (remembering) and C2 (understanding).

But in reality, based on interviews from several mathematics teachers at MTs Negeri 2 Rantauprapat, it was stated that there were still many students who had difficulty working on math problems and did not follow the learning process. This is indicated by a lack of student attention to learning activities and a lack of motivation to learn so it is difficult to work on the questions because they do not understand the questions given by the teacher. In addition, the learning method used is still monotonous, namely the expository method, where the expository approach is a learning technique that highlights the strategy of providing material verbally from a teacher to students. Thus, making students easily bored and not concentrate anymore. This has an impact on students' low capability to comprehend mathematical concepts, as seen from the following symptoms; some students are less competent to understand and solve questions, some students are lazy to work on questions because they think mathematics is complicated and tedious, and students tend to be lazy to participate in question-and-answer activities. Apart from that, from what I have observed, the condition of the school environment, such as facilities and infrastructure, are still not sufficient to facilitate all students at school. like textbooks that are still shared.

The results of observations of MTs Negeri 2 Rantauprapat students from the initial tests carried out are as follows, The 32 students in class VIII-A MTs Negeri 2 Rantauprapat who had filled escape the motivational questionnaire, it was found that based on the consequences of the analysis 32 students had a level of motivation that was classified as Enough. Then the average percentage of motivation results obtained, namely 55.98%, is classified as Enough according to Criteria for percentage of learning motivation adopted by Arikunto (2018). With each percentage per indicator, namely first needle there is passion and urge to achieve is 55,10%, Second needle there is encouragement and need in learning is 60%, third needle there are expectancies and aspirations for the future is 56,60%, fourth indicator there is appreciation in learning is 53,44%, fifth indicator there are interesting actions in learning is 55,10%, and sixth indicator there is a conductive learning environtment, so that it allows a student to study well is 55,20%.

By the results of the initial test of underatanding of mathematical concepts, it is known that there is average score of students' understanding of mathematical concepts is 24.58%. According to the percentage criteria adopted by (Arikunto, S & Jabar, 2018), it is still low. Question number one is a question for indicator restate the concepts that have been learned is included in the moderate category and the percentage of correct answers is 41.40%. Question number two is a question for indicator classifying objects based on mathematical concepts also fall into the medium category with the percentage of correct answers is 41.40%. Question number three is a question for indicator give examples or counterexamples of the concepts being studied belonging to the medium category with a percentage of correct answer is 35.90%. Question number four is a question for indicator applying concepts algorithmically belongs to the low class, namely with a percentage of correct answer is 23.40%. Question number five is a question for indicator presenting concepts in various representations is included in the low category with a percentage of correct answer is 1.50%. Question number six is a question for indicator linking various mathematical concepts internally or externally is also included in the low class, with a percentage of correct answer 3.90%.

The objectives of this study are:

1. Increasing the understanding of mathematical concepts for class VIII students of MTs Negeri 2 Rantauprapat through the Problem Posing approach.
2. Increasing the learning motivation of class VIII students of MTs Negeri 2 Rantauprapat through the Problem Posing approach.

2. METHODE

In accordance with the problems raised on the background of the problem that teachers and students face problems in learning which results in student motivation and the capability to comprehend students' mathematical concepts to be low. Therefore it is necessary to take an action. To carry out these actions required the type of research. The type of analysis used is Classroom Action Research which is carried out collaboratively with class teachers. This type of research uses cycles where apiece cycle consisted of problem, planning, implementation, observation, data analysis, and reflection stages. Data assembly techniques utilized in this study included tests and observations. Data collection instruments used were tests, questionnaires, and observation sheets. This study aims to increase students' motivation and ability to understand students' mathematical concepts through a problem posing approach. The subjects in this study are 32 Students class VIII-A of MTs Negeri 2 Rantauprapat, for the 2022/2023 academic year.

3. RESULT AND DISCUSSION

Founded on the results of research on learning motivation and understanding of mathematical concepts in class VIII A MTs Negeri 2 Rantauprapat after applying the Problem Posing learning model using a questionnaire and also a concept understanding test obtained results that achieved indicators of success by

going through 3 cycles. The research was carried out in 3 cycles because in cycle 1 and cycle 2, the indicators of success had not been achieved, so it was continued to cycle 3 and in cycle 3 the indicators of success had been achieved. Recapitulation of the outcomes of student learning motivation and student's understanding of mathematical concept can be seen in the next table and graph :

Table 1. Recapitulation of Motivation Questionnaire Results Per Cycle

Cycle	Score percentage	Category	Information
Pre Cycle	55,98%	Enough	Not Reached
Cycle I	67,77%	Good	Not Reached
Cycle II	75,48%	Good	Reached
Cycle III	86,30%	Very Well	Reached

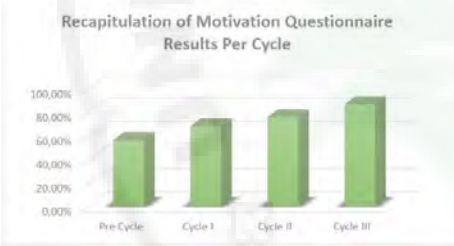

Figure 1. Recapitulation of Motivation Questionnaire Results Per Cycle

Based on Table 1. And Figure 1. At the pre-cycle stage, the percentage gain still uses monotonous learning methods and the results are not satisfactory. Of the 32 students in class VIII A of MTs Negeri 2 Rantauprapat, they had motivation with an average percentage of 55.98% in the Enough category, while the indicator of success was the average student learning motivation reached≥ 75%. In the first cycle stage, based on the results of the questionnaire, an increase in students' motivation to learn mathematics was obtained as indicated by the percentage gain of 67.77%. This shows that there was an increase from Pre-cycle to Cycle I of 11.79%. Even though there has been an increase, the results in cycle I have not yet reached an indicator of success, because many students still seem confused and not used to it because they have to adapt to a new learning model. In this cycle, there are still many students who are passive in learning. There are still many students who are shy and do not have the courage to express their opinions. So proceed to the stage of cycle II.

In cycle II, founded on the results of the questionnaire the students' motivation to learn mathematics was directed with a percentage gain of 75.48%. This shows that there was an upsurge from cycle I of 7.71%. Founded on the results of the percentages obtained in the second cycle stage, the indicators of success in learning motivation have been achieved. Because there are still obstacles, namely in the form that not all students from class VIII AA MTs Negeri 2 Rantauprapat have reached the indicator of success in learning motivation, so proceed to cycle III stage.

In cycle III, founded on the outcomes of the questionnaire the students' motivation to learn mathematics was shown by obtaining a percentage of 86.30%, this percentage was included in the very well category. This shows that there was an increase from the previous cycle of 10.82%. Based on the percentage results obtained at this stage of cycle III, all students from class VIII A MTs Negeri 2 Rantauprapat have achieved indicators of success in learning motivation. Then, Recapitulation of the outcomes of students' Understanding of Mathematical Concepts can be seen in the next table and graph:

Table 2. Recapitulation of Mathematical Concept Understanding Test Results Per Cycle

Cycle	Score percentage	Category	Information
Pre Cycle	24,58%	Low	Not Reached
Cycle I	41,67%	Currently	Not Reached
Cycle II	69,01%	High	Not Reached
Cycle III	90,89%	High	Reached

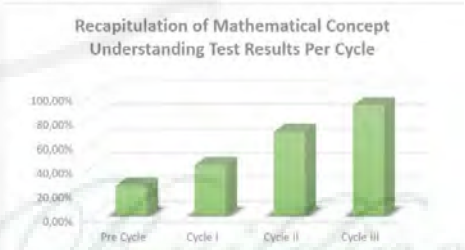

Figure 2. Recapitulation of Mathematical Concept Understanding Test Results Per Cycle

Table 2. and Figure 2. show the outcomes of students' mathematical concept comprehension tests, at the pre-cycle stage none of the students who completed the KKM score with an intermediate percentage score of 24.58% were included in the Low category. This happens because students forget the material studied before so they cannot answer the diagnostic test questions for understanding mathematical concepts. Then a further stage is needed so that the value of students' understanding of concepts reaches indicators of success.

Founded on the results of the cycle I test, it was obtained data that all students had not yet reached the KKM with an intermediate percentage score of 41.67% included in the current classification. Based on the test results, from pre-cycle to cycle I, there was an increase of 17.09%. With results that have not yet reached an indicator of success, namely a class is said to have completed learning if 85% of the class has achieved Learning Mastery ≥75, this research is continued in cycle II at a different time.

From the results of the cycle II test, it was obtained that 11 students (34.37%) had completed their studies and 21 students (65.63%) had not completed their studies with an average percentage score of 69.01% contained in the High classification. Based on this data, it can be seen that student test scores from cycle I to cycle II have enriched by 27.34%. However, the implementation of learning in cycle II has not yet reached the established classical completeness criteria. So this research needs to be continued in cycle III at a different while.

In the outcomes of the cycle III test, it was obtained that all students had completed achieving the KKM with an average percentage of 90.89% contained in the High classification. Based on these data, it can be seen that the value of the test results in cycle III has enriched again from the previous cycle of 21.88%. In cycle III this has fulfilled the predetermined learning completeness criteria, namely a class is said to have completed learning if 85% of the class has achieved Learning Mastery ≥75, so that class action research is stopped in this third cycle.

The results of the research data are in accordance with the learning theory put forward by Robert M. Gagne who said that learning is a process that permits humans to alter manners eternally, so that the exact transformations will not happen in new occasions. In addition, Gagne stated that adultness is not received through learning, because transformations in manners that occur are the result of the development of the system in the human being. There are eight phases that must be carried out in learning including the first is motivation and the second is understanding the concept. Of the eight phases in learning according to Robert M. Gagne it can be seen that in the very first learning that must exist and is really needed is student motivation in learning so that later students can efficiently absorb and comprehend the lesson and go through the next learning phases. From the learning theory according to Robert M. Gagne it can be concluded that it takes motivation and understanding of concepts in learning so that the learning process is fulfilled.

From the results of the presentation above, it can be seen that the highlight is that there was a drastic increase from cycle 2 to cycle 3 which made all students (100%) achieve the criteria for completion. This is due to the fact that the material tested and taught in cycle 1 and cycle 2 is the same, namely the material on flat-sided spatial shapes, while in cycle 3 the material taught and tested is statistics material. In cycles 1 and 2, the questions tested on students had a higher level of difficulty than in cycle 3. The questions in cycles 1 and 2 had more complicated applications and required a high level of understanding to solve the questions, whereas in cycle 3 , the questions tested are still basic initial material such as definitions and applications to simple data. Because in cycle 3 the material taught is still initial material. The real improvement results are in the increase from cycle 1 to cycle 2 because the material and difficulty of the questions are the same.

4. CONCLUSION

Based on the research results and data obtained, the conclusions of this study with regard to the research objectives have been formulated as follows:

1. With the Problem Posing learning model can increase students' understanding of mathematical concepts in class VIII MTs Negeri 2 Rantauprapat. Students' understanding of mathematical concepts increased from pre-cycle to cycle I by 17.09%, from cycle I to cycle II by 27.34% and from cycle II to cycle III by 21.88%. This can be seen from the percentage of the pre-cycle stage (24.58%) that has not been reached, cycle I (41.67%) has not been reached, cycle II (69.01%) has not been reached, and cycle III (90.89%) has been reached.
2. With the Problem Posing learning model can increase student motivation in class VIII MTs Negeri 2 Rantauprapat. Student motivation increased from Pre Cycle to Cycle I increased by 11.79%, from cycle I to cycle II increased by 7.71% and from cycle II to cycle III increased by 10.28%. This can be seen from the percentage of pre-cycle stages (55.98%), cycle I (67.77%), cycle II (75.48%), and cycle III (86.30%).

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