

## Research Article

# Edmodo-based Blended Learning to Improving Mathematical Communication Skills and Self-regulated Learning of High School Students'

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This study aims to assess the improvement of mathematical communication skills and self-regulated learning in students who engage in Edmodo-based blended learning models. This research employed a quasi-experimental method. The study involved students from the first grade of high school, comprising 32 students from class MIPA 7 and 32 students from class MIPA 8. The instruments used included a test and a questionnaire. The data analysis utilized the t-test through SPSS 25.0 for Windows, specifically the Independent Sample T-test. The results indicated that 1) overall, Edmodo-based blended learning models is effective in improving students mathematical communication skills and self-regulated learning; 2) In the KAM category (high), Edmodo-based blended learning models are effective in improving students self-regulated learning; 3) The effectiveness of Edmodo-based blended learning models for students' mathematical communication abilities is classified into medium categories. Edmodo-based blended learning has implications for teacher activeness by using technology in education and promotes student self-reliance in the learning process.

**Keywords:** blended learning, emodo, mathematical communication skills, self-regulated learning.

## 1. INTRODUCTION

One of the objectives of mathematics education in schools is mathematical communication [1]. Mathematical communication ability is a goal that must be achieved in learning mathematics. The target that must be achieved in learning mathematics is the ability of students to communicate ideas using symbols, tables, diagrams, or other media as the mathematical objects they are using. Communication skills are the ability of students in conveying information obtained through conversations or classroom activities [2].

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When students are encouraged to interact with each other, they will be able to build their own individual and conceptual understanding [3]. The process in mathematical communication can also provide students the opportunity to share ideas of their own [4].

It is very important for students to develop their communication skills in mathematics because the role of mathematics is not only as a media to stimulate logical thinking, pattern-creating, problem-solving, and conclusion drawing, but also as the social activity in learning, and a means of interaction between the teachers and the students as well as among the students themselves [5]. If the communication between students and teachers does not go well, it can result in a lack of mathematical communication skills. As a result, students become less interested in learning and cannot develop a mindset.

The results of the international assessment conducted by the Program for International Student Assessment or PISA in 2015 showed that Indonesia was ranked 64<sup>th</sup> out of the 72 countries evaluated in the assessment [6]. This result is because a major number of students in Indonesia are falling behind in problem-solving skills one of which is mathematical communication skills. The cause of low or lack of communication skills is because students lack confidence and cannot understand well mathematical concepts and teacher explanations [7]. Furthermore, students' written mathematical communication skills are included in the low group because: (1) students are less able to express problems in mathematical models correctly; (2) students cannot follow the stages of problem-solving to completion; (3) students cannot get the completion of the final results that have been done; (4) students are less able to describe the mathematical solutions they get [8]. This means that it can be said that students' mathematical communication skills in mastering mathematics subject matter can be said to be still experiencing difficulties.

In addition to the cognitive abilities possessed by students, it is also essential to have practical skills, namely self-regulated learning. Students who have to self-regulated learning can build learning goals seek to monitor, regulate, and control their cognition, motivation, and behavior to manage the plans that have been designed [9]. But in fact, students' self-regulated learning is in a low category. This event can be observed from the research results that students in the self-regulated learning group only reach one level of critical mathematical thinking, namely clarification [10]. This is because subjects in the self-regulated learning group are still not able to learn independently, are still dependent, and need encouragement from others to master the material being taught. In line with the research results, it was reported that students were also still weak in the indicators of having their own initiative with a percentage of 65.51% [11]. This is

indicated by students not repeating lessons at home. They only study mathematics in school without having their plans.

One of the factors thought to affect the low mathematical communication skills and self-regulated learning is the lack of a learning process that supports the development of students' thinking skills. The factor that causes the lack of development of thinking skills is that the curriculum is generally designed with broad material targets so that teachers focus more on learning and the teachers lack understanding of learning methods [12]. This will effect the readiness of students to face the future. Mathematics is still considered a complex science to learn, so the impact is that students increasingly do not understand, do not like, and often avoid it. Thus, we need a mathematics learning activity to improve mathematical communication skills and self-regulated learning in the classroom.

World Health Organization reports a case of pneumonia with unknown etiology in Wuhan City, Hubei Province, China. It has been found that pneumonia is a new type of coronavirus. In Indonesia, Minister of Education and Culture, Nadiem Makarim, supports education to dismiss lectures because of the increasingly worrisome distribution of COVID-19, so the learning process that usually includes class meetings is diverted by online meetings or work from home (WFH). In the 21<sup>st</sup> century, technology has become one of the critical things in implementing various activities. The progress that occurred in the 21<sup>st</sup> century is a challenge for teachers as educators, especially in implementing learning by integrating technology [13].

A teacher must obtain learning materials that are suitable for online learning and are applicable in life as well. Researchers suggest that one of the models that might improve students' mathematical communication skills and self-regulated learning is the blended learning model. Blended Learning process is relatively more flexible in its practice. The use of e-learning or online learning is one form of the flexibilities of its process [14]. This learning is perfect to use in the current era, because it combines two learning methods at once. In this study, the e-learning platform that will be used for the students' online is Edmodo. Edmodo is an online platform used for the teaching and learning activities by teachers, lecturers, students, as well as parents or guardians. The advantages of edmodo-based blended learning as follows: providing individual learning experiences, supporting and encouraging independent and collaborative learning, increasing the involvement of pre-service teachers in learning, and providing flexible learning anytime and anywhere [15]. The influence of the use of blended learning on science process skills and learning out-comes [16]. There was a significant increase in the cognitive and psychomotor domains as well as student motivation and learning outcomes after

learning was done using the Blended Learning model [17]. The use of blended learning in improving student characteristics and design features has a significant category for student learning outcomes [18]. Based on the study's results, it can be concluded that the application of the blended learning model in learning can improve student academically achievement [19].

This online learning process is undoubtedly the first time learning. It provides a meaningful experience for students [20]. The transition to the online learning system indirectly affects students' mathematical communication skills. Lack of control from teachers gives them more freedom to be at home or elsewhere. In this case, the implementation of learning at home makes self-regulation in learning, or self-regulated learning, needs to be developed by every student. Students who understand self-regulated learning can help them learn to the fullest and improve their academic achievement. In addition, students can also practice their mathematical communication skills. Namely, students will get material, assignments, and practice questions outside the classroom online through Edmodo. This convenience allows students to learn anywhere and anytime, not limited by distance and time. After students get the learning at home, students present the results of learning through e-learning in class and discuss them with other students; with this, it is expected that students will be able to improve their mathematical communication skills [21].

## 2. RESEARCH METHOD

This research is quasi-experimental research with pre-test and post-test designs for non-equivalent control group. Those research subjects were students from the 1<sup>st</sup> grade in one of the public high schools in Karawang, with the composition of: 32 students from class MIPA 7 received *Edmodo*-based blended learning and 32 students from class MIPA 8 received blended learning without *Edmodo*. The research subjects were picked using the purposive sampling method, which is a sampling method created on certain considerations set by the researcher [22]. This technique was used because the sampling was not taken randomly because of the school's administrative rules, so the researchers used existing classes.

The data collected in this study was the test a of the student's mathematical communication skills obtained and questionnaire self-regulated learning. Mathematical communication skills test questions about 5 things that are adjusted to each indicator and a scale such as 30 statements. The test was given before and after the students' mathematics class. The test was aimed to see the overall development (N-Gain score) of the students'

mathematical communication skills and self-regulated learning. The collected data was then processed using the SPSS 25 software is independent sample T-test.

### 3. RESULT AND DISCUSSION

#### 3.1. Mathematical Communication Skills

The results and the analysis conducted in this research will be presented descriptively. This method is to show the development of the students' mathematical communication skills on a particular math subject regarding Systems of Linear Equations in Three Variables and to compare that development between the group of students who received Edmodo-based blended learning and the group of students who received blended learning without Edmodo.

Based on the results of the study, it was shown that the overall improving and achievement of the communication skills in students who received Edmodo-based blended learning is higher than that the communication skills in students who received blended learning without Edmodo. The data can be seen in Table 1.

TABLE 1: Mathematical communication ability data statistics results.

Category	Stat.	With Edmodo				Without Edmodo			
		Pre-Test	Post-Test	Gain	N	Pre-Test	Post-Test	Gain	N
General Overview	$\bar{x}$	14.28	60.94	0.532	32	12.72	52.34	0.450	32
	s	11.971	15.577	0.198		8.748	15.760	0.182	
Students with High KAM	$\bar{x}$	16.25	70.00	0.635	8	15.78	61.11	0.354	9
	s	11.877	12.247	0.152		9.897	16.915	0.202	
Students with Medium KAM	$\bar{x}$	15.71	58.53	0.490	17	13.33	49.44	0.411	18
	s	13.171	13.666	0.199		7.670	15.329	0.182	
Students with Low KAM	$\bar{x}$	8.57	56.43	0.518	7	5.00	47.00	0.440	5
	s	8.018	20.759	0.228		7.071	10.368	0.115	

Furthermore, to find out whether the improving and achievement of mathematical communication skills in students who received blended learning using Edmodo is higher than the students who received blended learning without Edmodo, the following hypothesis was proposed: Hypothesis 1, the improving and achievement of mathematical communication skills in students who received blended learning with Edmodo is higher than in students who get blended learning without Edmodo, based on: a) the general overview, b) the students' KAM category.

The hypotheses will be tested for differences in the mean of the data of the students' mathematical communication skills. But a few prerequisite tests need to be conducted beforehand, which are data normality tests and homogeneity of variants tests. This means that on the overall data and on the data based on students' KAM, the mean difference test conducted will use the Independent Sample t-test and Uji Mann Whitney with a significance level of 0.05 and the results will be seen in the significant value on the Equal Variances Assumed line. The results are shown in Table 2.

TABLE 2: Average differences test on students' mathematical communication skills based on the general overview and the students' KAM.

Category	Learning	Statistic test	Sig.	
<b>Achievement</b>				
General Overview	With Edmodo	Independent Sample t-test	0.016	Rejected
	Without Edmodo			
Students with High KAM	With Edmodo		0.119	Accepted
	Without Edmodo			
Students with Medium KAM	With Edmodo		0.037	Rejected
	Without Edmodo			
Students with Low KAM	With Edmodo	Uji Mann Whitney	0.229	Accepted
	Without Edmodo			
<b>Improving</b>				
General Overview	With Edmodo	Independent Sample t-test	0.045	Rejected
	Without Edmodo			
Students with High KAM	With Edmodo		0.130	Accepted
	Without Edmodo			
Students with Medium KAM	With Edmodo		0.114	Accepted
	Without Edmodo			
Students with Low KAM	With Edmodo		0.250	Accepted
	Without Edmodo			

In table is shown the results from the difference test of the KAM average in students who used Edmodo and students who did not. H0 is rejected for hypothesis 1, which is the overall the improving and achievement. While H0 is accepted for hypothesis 1, which is based on KAM. It can be seen from the results of Bibi & Jati's research that BL has succeeded in increasing students' learning motivation and understanding [23]. This research is in line with research Rizqi that applying problem-solving-based BL can

improve students' mathematical communication skills. This is shown by students being able to master and write the data contained in the questions, what questions, and can create ideas to solve the problems given [24].

From these results, it can be concluded that the overall use of Edmodo provide higher effect than blended learning that is carried out without Edmodo, since Edmodo has certain useful advantages, namely: the students can easily interact with the teachers and with their fellow students; and the teachers can provide teaching materials in the form of student worksheets or pdf files that can be downloaded by the students.

Several factors cause the absence of achievement in mathematical communication skills. In filling out the mathematical communication ability pretest questions, students tend to fill in using logic and carelessly. While in the posttest, students work more carefully, but there are still many who are stuck with the questions given. This is in line with the results of Nurjanah's research that students are late in collecting the test given, so students work in a hurry and answers are not correct anymore, and students experience problems in doing such as answering inaccurately. So students can see other answers students when working on pretest questions [25].

The absence of any differences in the improving of mathematical communication skills between the students from the 2 groups based on their KAM category is due to a few unfavourable learning conditions in the classrooms caused by a number of reason, for example: chatty and noisy students, or the use of cell phones by some students for purposes other than academic purpose. Furthermore, the unpreparedness of some students for the scheduled post-test resulted in the post-test score that did not match the expected score. The other contributing factors were the instability of the internet connection which caused the platform to run slower than usual and the lack of a private chat feature in the platform for the students to interact privately. This is in line with the results of research by Purnama & Afriansyah, which can hinder the implementation of learning is the lack of facilities that support the continuity of the learning process while the available time is limited and insufficient [26].

The proof that BL process with Edmodo is better than BL without Edmodo cannot be seen only from the advantages or disadvantages of each BL process. There may be other factors that showed that the former is better than the latter, for example: the test score obtained from students in the Edmodo-based BL class is overall higher compared to the test score of the students from the BL class without Edmodo. Indirect effect include uneven facilities owned by students, including computers and access to the internet. The lack of knowledge of student learning materials, teachers, and parents on the use of the internet.

The use of Edmodo and the internet is effective to help teachers improving the student learning outcomes. The use of learning medias in the teaching and learning process has several benefits including: attracting more attentions from the students to engage in the learning activity, providing clearer materials for students to understand, providing wider range of teaching methods to be used, engaging students to not only listen to the material explained by the teachers but also to other activities in learning such as observing [27].

Based on this explanation, it can be said that the BL both conducted with or without Edmodo has the same role in developing the students' knowledge of materials related to mathematical communication skills.

### 3.2. Self-regulated Learning

Based on the results of the study, it was shown that the overall the improving and achievement of the self-regulated learning in students who received Edmodo-based blended learning is higher than that the self-regulated learning in students who received blended learning without Edmodo. The data can be seen in the following Table 3.

TABLE 3: Self- regulated learning data statistics results.

Category	Stat.	With Edmodo				Without Edmodo			
		Pre-Test	Post-Test	Gain	N	Pre-Test	Post-Test	Gain	N
General Overview	$\bar{x}$	99.808	101.773	0.012	32	97.936	89.979	-0.163	32
	s	10.025	10.383	0.263		9.269	9.932	0.140	
Students with High KAM	$\bar{x}$	94.958	103.011	0.149	8	100.529	89.806	-0.222	9
	s	10.924	13.020	0.133		9.395	11.266	0.145	
Students with Medium KAM	$\bar{x}$	102.957	98.772	-0.122	17	98.807	90.590	-0.166	18
	s	9.824	9.230	0.277		8.377	10.418	0.132	
Students with Low KAM	$\bar{x}$	97.702	107.648	0.182	7	90.136	88.095	-0.044	5
	s	7.616	8.017	0.147		7.616	6.571	0.100	

Furthermore, to find out whether the the improving and achievement of self-regulated learning in students who received blended learning using Edmodo is higher than the students who received blended learning without Edmodo, the following hypothesis was proposed: Hypothesis 1, the improving and achievement of self-regulated learning in



students who received blended learning with Edmodo is higher than in students who get blended learning without Edmodo, based on: a) the general overview, b) the students' KAM category.

The hypotheses will be tested for differences in the mean of the data of the students' self-regulated learning. But a few prerequisite tests need to be conducted beforehand, which are data normality tests and homogeneity of variants tests. This means that on the overall data and on the data based on students' KAM, the mean difference test conducted will use the Independent Sample t-test, uji t' and Uji Mann Whitney with a significance level of 0.05 and the results will be seen in the significant value on the Equal Variances Assumed line. The results are shown in the Table 4:

TABLE 4: Average differences test on self-regulated learning based on the general overview and the students' KAM.

Category	Learning	Statistic test	Sig.	Description
<b>Achievement</b>				
General Overview	With <i>Edmodo</i>	Independent Sample t-test	0.000	Rejected
	Without <i>Edmodo</i>			
Students with High KAM	With <i>Edmodo</i>	Uji-Man Whitney	0.027	Rejected
	Without <i>Edmodo</i>			
Students with Medium KAM	With <i>Edmodo</i>	Independent Sample t-test	0.010	Rejected
	Without <i>Edmodo</i>			
Students with Low KAM	With <i>Edmodo</i>		0.001	Rejected
	Without <i>Edmodo</i>			
<b>Improving</b>				
General Overview	With <i>Edmodo</i>	Uji-Man Whitney	0.000	Rejected
	Without <i>Edmodo</i>			
Students with High KAM	With <i>Edmodo</i>	Independent Sample t-test	0.000	Rejected
	Without <i>Edmodo</i>			
Students with Medium KAM	With <i>Edmodo</i>	Uji-t'	0.558	Accepted
	Without <i>Edmodo</i>			
Students with Low KAM	With <i>Edmodo</i>	Independent Sample t-test	0.070	Accepted
	Without <i>Edmodo</i>			

In table is shown the results from the difference test of the KAM average in students who used Edmodo and students who did not.  $H_0$  is rejected for hypothesis 1, which is the overall the improving and achievement. While  $H_0$  is accepted for hypothesis 1, which is based on KAM. Supported research results by Ningsih et al. said that increasing the learning independence of students who received BL learning was better than students who received ordinary learning [28]. For all students, this learning is suitable for

improving students' critical thinking and mathematical communication skills to prepare themselves for the industrial revolution 4.0. However, the results of research Kurnia & Warmi state that students who do not fully have independent learning, so there are still students who do not have independence in learning [29].

The absence of improvement can be seen from what happens in the learning process students have less time to discipline. It can be seen when students collect assignments that the teacher has determined, and some students collect assignments more than the specified time.

In addition, many factors influence students to be independent in learning, including internal and external factors of students, peers, genetics or descendants from parents, parenting patterns, education systems in schools, and systems life in society, because taking advantage of environmental conditions different from the urban environment makes it easy to be influenced by an outside culture [30]. This lack of independence results in low student motivation, inability to make decisions, low learning outcomes, and the lack of functioning of students in society.

### 3.3. Effect Size

To find out how big the contribution (effect size) of learning using Edmodo-based blended learning is to students' mathematical communication skill, we use the effect size calculation. To calculate the effect size, Cohen's formula is used. The results are shown in the Table 5:

TABLE 5: Result data effect size of learning using edmodo-based blended learning is to students' mathematical communication skill.

Learning	N	Average	Varian's	Effect (Cohen's)	Size	Category (Cohen's)
With <i>Edmodo</i>	32	60.938	15.577	0.5485		Medium
Without <i>Edmodo</i>	32	52.344	15.760			

The results of the effect size of Edmodo-based blended learning on mathematical communication skills belong to the medium category This means that Edmodo-based blended learning has a sufficient role in improving students' mathematical communication skills.Supported by the opinion of Hamka and Effendi that this Edmodo-based BL learning media can be done quickly, attractively, and efficiently without being limited by space. The outline in this online class is that there is internet access, and if internet access is not supported, online classes cannot take place well [31]. This is in line with the results of Hardhono research that students experience problems with electronic devices

such as cellphones and laptops or constraints on quotas, which causes materials and assignments not to be seen or done directly by students because of these constraints [32].

## 4. CONCLUSION

The findings in this study indicate that students are enthusiastic and enjoy learning statistics with Edmodo-based blended learning. Edmodo-based blended learning forces students to continue to observe its application because learning materials and assignments are sent via Edmodo, as well as explanations of learning materials posted on Edmodo, to encourage students to continue to access the Edmodo application. The time limit in collecting assignments spurred students also to collect duties on time because if they were late in seconds, then the task collection system in Edmodo could not be accessed anymore, which meant the charges could not be collected. Blended learning with Edmodo is an intelligent solution in the condition of the COVID-19 pandemic because teachers and students can still do the learning even at home or anytime. Learning can be done online from each home without reducing the essence of learning itself. So that the learning objectives are achieved and the competencies expected from students are also performed. The results of this study need to be disseminated more widely so that each mathematics teacher can use Edmodo-based blended learning in mathematics learning. The application of this research can be used as a reference in the development of blended learning in other subjects related to mathematics.

## References

- [1] Allen CE, Froustet ME, LeBlanc JF, Payne JN, Priest A, Reed JF, et al. National council of teachers of mathematics. *Arith Teach.* 2020;29(5):59.
- [2] Nofrianto A, Maryuni N, Amri MA. Komunikasi matematis siswa: pengaruh pendekatan matematika realistik. *Jurnal Gantang.* 2017;2(2):113–21.
- [3] Lomibao LS, Luna CA, Namoco RA. The Influence of mathematical communication on students' mathematics performance and anxiety. *Am J Educ Res.* 2016;4(5):378–82.
- [4] Chung Y, Yoo J, Kim SW, Lee H, Zeidler DL. Enhancing students' communication skills in the science classroom through socioscientific issues. *Int J Sci Math Educ.* 2016;14(1):1–27.
- [5] Baroody AJ. *Problem Solving, Reasoning, and Communicating, K-8 Helping Children Think Mathematically.* New York: Macmillan Publishing Company; 1993.

- [6] O.E.C.D. PISA 2015 Results in Focus. Columbia University, New York.
- [7] H. Hendriana, "Pembelajaran dengan pendekatan metaphorical thinking untuk meningkatkan kemampuan pemahaman matematik, komunikasi matematik dan kepercayaan diri siswa sekolah menengah pertama," (2009).
- [8] Achir YS, Usodo B, Setiawan R. Analisis kemampuan komunikasi matematis siswa dalam pemecahan masalah matematika pada materi Sistem Persamaan Linear Dua Variabel (SPLDV) ditinjau dari gaya kognitif. *Jurnal Penelitian Pendidikan*. 2017;20(1):78–87.
- [9] Nú nez JC. "Intellectual abilities, thinking styles and academic achievement.," Eds. *Psicothema*. 2008;:45–66.
- [10] Q. Ainiyah, H. Suyitno, E.R. Winarti, and Prisma, "Analisis kemampuan berpikir kritis matematis pada pembelajaran pspbl berbantuan smart point ditinjau dari kemandirian belajar.," In: *PRISMA: Prosiding Seminar Nasional Matematika*. pp. 279–288 (2018).
- [11] Ansori Y, Herdiman I. Pengaruh kemandirian belajar terhadap kemampuan pemecahan masalah matematis siswa SMP. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*. 2019;3(1):11–9.
- [12] Damanik DP, Bukit N. Analyze critical thinking skills and scientific attitude in physics learning used inquiry training and direct instruction learning model. *Jurnal Pendidikan Fisika*. 2013;2(1):16–24.
- [13] Aini DF. Pengembangan pedoman e-modul berorientasi student active learning sebagai pendukung pembelajaran di Sekolah Dasar. *Jurnal Pendidikan Dasar Nusantara*. 2020;5(2):292–304.
- [14] Garrison DR, Vaughan ND. *Blended Learning in Higher Education: Framework, Principles, and Guidelines*. San Francisco (CA): John Wiley & Sons; 2008.
- [15] Martin JS, Kreiger JE, Apicerno AL. Effectiveness of a hybrid classroom in the delivery of medical terminology course content relative to a traditional classroom format. *J Scholarsh Teach Learn*. 2015;15(5):72–81.
- [16] Harahap F, Nasution NE, Manurung B. The effect of blended learning on student's learning achievement and science process skills in plant tissue culture course. *Int J Instr*. 2019;12(1):521–38.
- [17] Firdaus S, Isnaeni W. Motivation and learning achievement of primary students in theme-based learning using blended learning model. *Journal of Primary Education*. 2018;7(3):324–31.
- [18] M.J. Kintu, C. Zhu, and E. Kagambe, "Blended learning effectiveness: The relationship between student characteristics, design features and outcomes.," *International*

- Journal of Educational Technology in Higher Education*. vol. 14, no. 1, p. 2017.  
<https://doi.org/10.1186/s41239-017-0043-4>.
- [19] Ceylan VK, Elitok Kesici A. Effect of blended learning to academic achievement. *Int J Hum Sci*. 2017;14(1):308.
- [20] Dewi WA. Dampak COVID-19 terhadap implementasi pembelajaran daring di sekolah dasar. *Edukatif : Jurnal Ilmu Pendidikan*. 2020;2(1):55–61.
- [21] Gredler ME. “Learning and instruction: Teori dan aplikasi, terjemahan Tri Wibowo,.” *Jakarta: Kencana Prenada Media*. p. 2011.
- [22] Sugiyono, *Metode penelitian pendidikan: Pendekatan kuantitatif, kualitatif dan R&D*. Alfabeta, Bandung, 2013.
- [23] Bibi S, Jati H. Efektivitas model blended learning terhadap motivasi dan tingkat pemahaman mahasiswa mata kuliah algoritma dan pemrograman. *Jurnal Pendidikan Vokasi*. 2015;5(1):74.
- [24] Rizqi AA. Kemampuan komunikasi matematis siswa melalui blended learning berbasis pemecahan masalah. *PRISMA, Prosiding Seminar Nasional Matematika*. 2016;1(1):191–202.
- [25] S. Nurjanah, “Peningkatan kemampuan pemahaman relasional dan pemecahan masalah matematis serta self regulated learning siswa SMA melalui pembelajaran secara daring (Edmodo dan Google Classroom),” (2020).
- [26] Purnamasari A, Afriansyah EA. Kemampuan komunikasi matematis siswa smp pada topik penyajian data di pondok pesantren. *Jurnal Pendidikan Matematika*. 2021;1(2):207–22.
- [27] Zulfitria A, Fadhillah R. “Penggunaan Teknologi dan Internet sebagai Media Pembelajaran di Masa Pandemi Covid-19,.” In: *Prosiding Seminar Nasional Penelitian LPPM UMJ* (2020).
- [28] Ningsih YL, Misdalina M, Marhamah M. Peningkatan hasil belajar dan kemandirian belajar metode statistika melalui pembelajaran blended learning. *Al-Jabar : Jurnal Pendidikan Matematika*. 2017;8(2):155.
- [29] Kurnia D, Warmi A. Analisis Self-Regulated Learning dalam Pembelajaran Matematika pada Siswa SMP Kelas VIII Ditinjau dari Fase-fase Self-Regulated Learning. *Karawang*; 2020.
- [30] H.L. Tasaik and P. Tuasikal, “Metodik Didaktik,.” *Jurnal Pendidikan Ke-SD-an*. vol. 14, p.
- [31] Hamka D, Effendi N. Pengembangan media pembelajaran blended learning berbasis Edmodo pada mata kuliah fisika dasar di program studi pendidikan IPA. *Journal of Natural Science and Integration*. 2019;2(1):19.

- [32] Hardhono A. Potensi teknologi komunikasi dan informasi dalam mendukung penyelenggaraan pendidikan jarak jauh di indonesia. *Jurnal Potensi ICT PJJ Indonesia*. 2012;1:1–11.