

IMPROVING STUDENTS' CALCULUS MASTERY USING DRILL METHOD

Sedya SANTOSA

State Islamic University Sunan Kalijaga Yogyakarta, Indonesia

ORCID: <https://orcid.org/0000-0003-2148-8984>

sedya.santosa@uin-suka.ac.id

Vivin Devi PRAHESTI

State Islamic University Sunan Kalijaga Yogyakarta, Indonesia

ORCID: <https://orcid.org/0000-0002-4148-8327>

vivin.uinsuka@gmail.com

Received: June 5, 2022

Accepted: September 26, 2022

Published: October 31, 2022

Suggested Citation:

Santosa, S., & Prahesti, V. D. (2022). Improving students' calculus mastery using drill method. *International Journal of New Trends in Arts, Sports & Science Education (IJTASE)*, 11(4), 227-233.



This is an open access article under the [CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/).

Abstract

The study aims that describing learning outcomes and students' responses in improving students' calculus mastery using drill method. The study used qualitative research. This study is conducted in Elementary School of Pungging, Indonesia and the population one is grade 3rd students at around 24 students. Students are given a pretest and posttest to examine the understanding of the math lesson, related on calculation task. The data is analyzed as presented by Miles and Huberman which interview data and pre-test data are collected, and the data used observation ways to examine the data. Then, data is selected the rough data and Displaying and is drawn to become conclusions. The data concluded that drill method will be implemented in math problems, improving the rate of practices repeatedly so that students can remember math concepts, resulting in students' creativity. Such students can answer the question without thinking twice in drilling math and learn basic calculation repeatedly, enhancing master in math.

Keywords: Improving students, calculus mastery, drill method.

INTRODUCTION

Education related on learning activities which students are as a main subject, and the learning activities are as an object of learning. The learning activities create human interaction as a teaching process (Siadi et al., 2009). The ones are not only giving the lesson, but also studying students properly, so such learning generates meaningful concepts which change the way student think. The main problem that is found by the educators is the method used so that such people overcome method changing to get effective result based on learning circumstance. The learning quality can guide students in developing skills, attitudes, appreciation and knowledge, creating learning activities and giving meaningful learning (Kamil & Olvatika, 2015).

Education has a function to develop students' skills and need to be prepared a knowledge related on calculation so that learning one is an essential role for students to compute problems in daily life (Mulyani et al., 2020). Calculus learning needs as a basic concept in elementary school to help students in the next lessons (Mulyani et al., 2020). The way to master calculation is through drill method that train students enhance calculus mastery, and the educator should be have interested learning instead. However, the big problems are that students get difficulties to compute numbers so that the ones need more practices or drilling. Such a problem is found almost in every institution because some students consider that such learning is hard to solve before they get drilling. Also, students get bored due to math lesson repeatedly or being not interested in the lesson one. Therefore, learning one has to be arranged becoming enjoyable lesson (Astuti & Istiari, 2020).

Also, the educators facilitate and pay attention toward students for enhancing learning outcomes through method, utilizing procedures to get studying interaction to achieve learning purpose (Sudiyono, 2006). Sophisticated technology can be able to make balance between learning component

and the institutions attempted using drill method for gaining creativities and accuracy. There is an effort that has an effort to conduct learning processes completely through using variety of methods, and drill method is able to enhance students' calculus mastery.

Math is one of science related on real activities in daily life, improving knowledge. Math has different characteristic in thinking skills, helping to solve daily problems in the social life (Nisa & Karim, 2017). The subject one needs in globalization era that has important role in basic education (Afifah et al., 2015). Math can stimulate thinking skills and train remembering the lesson (Samosir, 2020), and the concept one is taught by connecting the lesson one to others, improving knowing sense about math lesson (Wardhani, 2017).

Mathematical literacy becomes the essential subject in social life that is included education programs to reach math goal in today's life (MATIĆ, 2014). Ministry of education states that 21th century applied creativity, critical thinking, communication and collaboration skills that related on learning processes in era of industry revolution 4.0 (Sartika, 2019). Such processes require online-based learning models to develop educational qualities, exploring their environment (Wewe & Kau, 2019). Also, calculus is one of branch of math that is contained a number of basic materials as a prerequisite in mastering in math, using patterns, reasoning, communicating an idea to solve the problem. Simmons states that there are trigonometry, algebra and geometry being prerequisites for studying calculus. Furthermore, calculus is a core course of math that has two branches namely differential and integral calculus, solving various problems (Latorre et al., 2007).

One of the important learning in math is calculation, giving lesson about number such as mentioning, ordering, subtracting and adding (Malapata & Wijayaningsih, 2019). According to the other studies from Mirawati, math can be implemented in various institution that can be conducted through students' growth and development despite of having mistaken (Misrawati & Suryana, 2021). Math learning related on number and analyzing, so there are classification, number and measurement that can stimulate thinking skills, influencing the students' development. Moreover, math calculation can be implemented in innovative learning to ease students grasp the lesson in calculation, using learning media to help educators delivering the lesson (Jogezai et al., 2021, Neppala et al., 2018). There is a finding research states that learning media can help students' calculation in math, based on students' needs (Sayekti, 2020) and becoming students getting easy to compute (Annisa et al., 2020).

Math is a subject that is in the all education, needed to all categories. However, some students consider that math is hard to get understanding since they have lack of practice, and such a subject has a discrepancy in learning through conventional method, referring to the theoretical behaviorism. Math is utilized to interpret the lesson to the students, and the teachers ask for students to complete calculus lesson by practice about calculations. The math concept is begun by thought approach in the intuitive learning to get easy students' activities, enhancing calculation skills. Basic calculation that is taught covering addition, subtraction, division and multiplication

Students' have to master in five skills to learn math, first, learning that encourage students to communicate (mathematical communication). Secondly, learning to think critically (mathematical reasoning), then learning to solve the problem (mathematical problem solving). Next, learning to connect the ideas (mathematical connection) and learning to represent the ideas (mathematical representation). In addition, math learning requires activities that related on symbols and real circumstances to solve the certain problem (Pendidikan, 2016).

Drill method is teaching method used to make students becomes active in learning processes, and such a method is conducted with the same method repeatedly. Also, drill method is to accomplish skills permanently, gaining practical processes and provide knowledge to produce learning outcomes (Fitriyah & Khaerunisa, 2018). The characteristic of drill method is a repeated the activity in the different circumstances and the skill can be completed to be reached. Drill process requires practice, time and students' responses properly, and the one is necessary to make fun and enjoy learning for changing early activities so that such students feel optimistic to learn. Educators enable to think about essential processes so that study needs and students' skills can be improved.

Giving stimulus with variety techniques is purposed to reach enjoyable learning, and students' can be interested in subject learned. Based on Muhaimin and Abdul Mujib in "*Pemikiran Pendidikan Islam*" explained that there is variety of drill method. Firstly, Inquiry techniques that divide students' in some groups is to solve a certain problem. The one is carried out to do the task that the educators give. Secondly, Discovery techniques involve students in learning activities not only discussion but also giving an opinion. Next, micro teaching is the techniques that is frequently utilized in teaching practices for enhancing the insights and skills. Then, Package learning is to support students' competition completely. Lastly, learning independently that encourages students become independent without any help from educators, but such techniques can be accompanied by educators as observer. Those techniques require choosing the lesson with techniques' combination, and techniques from educators (Maliki, 2017).

Learning method stages that can be implemented in learning activities that is, First, students is given knowledge based on theory that is implemented in the method. The next is educators giving an example drills before students is explained the real lesson. Then, educators give lesson carried out by students' through educator's guidance. Next, educators correct the answer that is done by students so that the ones can improve their mistaken. Furthermore, students should do practice repeatedly to reach better learning outcomes, and the last session is that there is an evaluation process regarding to the learning outcomes.

Drill method has characteristic that improving skills with strategy that has been learned. Also, Focusing on method and being ready in alternative method are essential. Method can give different understanding, and the math rules give a clear purpose. Furthermore, strengthen in drill method is that improving the skills, having different understanding and the insights that are gained oriented into mathematical theory (Primayanti et al., 2018). However, the weakness method one is making boredom, and practice that is guided by teacher directly will be hard to make improvement. Also, practice that is done repeatedly will be monotonous activities, blocking students' creativity.

Students who has a low capability has to understand instructional learning, teachers have a role to guide students understanding the lesson (Nasution, 2019). Students get a hard understanding toward the lesson, reducing lesson improvement, and the ones have to experience the ability to support the academic schools so that solving mathematical problems can be accomplished precisely. Students have a wrong concept to get the lesson, so they misconception about the mathematical concepts, and the obstacles that happened in the students when such people get failed to learning objectives. Thus, the ones cannot master in mathematical concepts (Wahyuni, 2017). Student should get used to practice every time to make a habit, resulting to them being used to calculate (PRAHESTI, 2019; Prahesti, 2020).

The students in Elementary School of Pungging, Indonesia are hard to calculate in basic math, so some experienced falling behind other to calculate addition, subtraction, division and multiplication. Based on students' outcomes of 2021/2022 academic year that students feel hard to conduct calculation courses, making them cannot follow next lessons since calculus being a core subjects in math.

METHOD

This research is a descriptive research with qualitative approaches to get interview and observation in the area, being conducted in 2021/2022 academic year. Study one focuses on learning outcomes and students responses to handle the lesson one. This study is conducted in Elementary School of Pungging, Indonesia and the population one is grade 3rd students at around 24 students. Students are given a pretest and posttest to examine the understanding of the math lesson, related on calculation task. Interview is carried out randomly for students, and the researcher observes students' outcomes toward the way to do calculus operation.

The data is analyzed as presented by Miles and Huberman which interview data and pre-test data are collected, while the data is reduced that is precise based on the data concepts. Then, data is selected

the rough data. Displaying of data that have been verified based on the rate of improving students' calculation, and next is the data presentation is drawn, becoming conclusions.

RESULTS and DISCUSSION

The finding of data is students' learning outcomes in the interview and observation, being collected in the different ways. Students are treated calculus lesson and how the way to solve the questions in order to know students' ability, and interview is carried out toward a random students in 3rd grade. Based on the interview was used to measure the student's ability to calculate basic math such as addition, subtraction, division and multiplication. The interview's questions are determined in the how the way they to solve basic math learning and why they feel struggling to master in calculation of math learning. The data that is gained is that almost 50% of random students cannot be able to master basic math since the ones have not been used to practice, becoming to students to hamper in calculus mastery. The ones only know the theory and rare practice so that they feel hard to solve. Also, students forget the way to calculate calculus theory so that they are struggling, and they do not get explanation from their teacher due to restriction of COVID cases. Students is giving stimulus to be more interedted in math, so that they can improve a bit. Due to virtual learning, some students believe that educators do not pay attention about the learning quality. Educators only focus on lesson so that they have not known about learning quality.

Students tend to train themselves by practicing so that they can achieve the lesson goal, and those enable to get drilling by educators who teach them in the class. Improving calculation can be trained to students who are interested in, making them knowing how to solve the math problems. Additionally, students have to know to to arrange their lesson based on their skills. The result based on student's answers that is gained in improving in calculus mastery in giving drill method, repeating to practice calculation gradually so that students are more likely to practice or do drilling in math to get the lesson, remembering the basic concept of math. Due to drilling the math question, such students can answer the question without thinking twice. Additionally, students get used to do drilling to reduce misunderstanding toward the lesson that can be examined comprehensively. They also often learn basic calculation repeatedly, enhancing master in math.

Regarding with the observation, students master in math being able to get the theoretical math precisely, making them to calculate as quick as possible, while for the ones who feel difficult to calculate forget the basic calculation. The writer observes that math lesson in the low class of elementary school related on addition, subtraction, division and multiplication in basic. However, there is a different result based on in the field showing students who have not accept the teachers' explanation being able to do the lesson so that they can do the task, while the others in the interview results need to more explanation and drill the math skills. Basically, students have the way to solve math problem although the ones have different ways, and they have different skills to improve math skills in calculation.

Based on the data students in the low level is not used to do drilling, making them forget about the concepts, while in the middle class, students need more practices more due to forget. For low level, educators or teachers have strategy to make students reducing problems in calculation. The high class, they master in math since they do practice or drill more and more, remembering the concept. Students are more likely to do drilling more when they can achieve their goal, but they need more practices. The differences between low, middle and high level are in their skills in calculation so that they are categorized becoming 3 different levels. Students who are in low level are more likely to forget the lesson so that they need for drilling processes, and some students master in calculation, but almost a half of students master in calculation so that they can solve math problem. Others need more practices to be mastery in calculation in some areas, and students are more likely to get difficulties in subtraction and multiplication, making them to do drilling. For students in the low level have to do drilling more to reduce misunderstanding for the learning process. When it comes to the math lesson, there are variety targeted learning that students in 3rd grade have to achieve the competency. To remember the concept, 3rd students need more time to practice repeatedly, achieving the targets being determined.

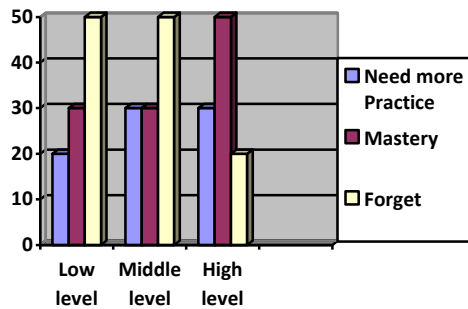


Diagram 1. Observation results improving calculus

A half of students need more practices in the middle level, showing the same as students master in calculation, while many students forget the lesson, making them get failed in calculation. Educators or teachers can master to compute lesson related on numbers through drilling process. Calculus mastery can be gained when students are used to train repeatedly, making them in higher level than others. Also, less students forget in certain lesson, having variety obstacles like less drillings In the interview processes, students have a lack of mastery in math due to many matters, alleviating the speed of calculating in calculation. Based on the interview, 10 of students chosen have a different matter to master in math before using drill method

Table 1. Observation results improving calculus

No.	The constraint found	*Information
1.	Students experienced confused to do math's questions	A
2.	Students do not accept the lesson, making them to feel hard	B
3.	Students have a different level to master calculation	B
4.	Students are less interested in the math	A
5.	Students do not know the way or strategy to calculate	A

*Information:

A: 50-90% of students = often

B: 10-50% of students= sometimes

Almost all students frequently get confused to solve math problem, and the ones do not get the lesson, making them feeling hard to accomplish the math's task. However, less than a half of students rarely do not learn the lesson before practicing the math, forcing them to think twice and will decrease the students' calculation. The data reveal that students experience different condition in term of calculus mastery since they have a different skill to solve math's problem so that they need more practices using drill. The researcher assumes that drill method will be implemented in math problems, improving the rate of practices repeatedly so that students can remember math concepts, resulting in students' creativity.

The study states that students have different skills to grasp the lesson so that they have different way to master calculation, making them to more struggle to achieve high score in math. Some have difficulties to accomplish the math's task, so they cannot complete them. Nevertheless, some have experiences to solve math problem based on the lesson, making them understand the way to do, and such questions are set based on formula that is given such as fraction, adding, multiplication, subtraction, wide and volume. Those lessons are implemented in the story question related on students' life so that students analyze the lesson more, while the basic calculation only finding the answer. The question one train the way students think so that they have different ways to solve the question. Some make confused due to similarity story that students should classify the lesson. They have to understand the question about, and they have to know which formula that is related on the question, resulting to them having correct answer. Students who experienced confusion can do math question. Hence, they require practice repeatedly.

Students have bad feeling that make them cannot concentrate to study. Some do not understand, resulting to them hard to answer due to the level of lesson. The higher the lesson, the harder the way to solve, such lessons make students struggling to answer, and such students do not want to accept the lesson due to harder lesson. Moreover, increasing concentration give an impact to accomplish the task, but they feel hard to concentrate due to feeling, tired and emotion. Students need practice more and more so that they can control their emotion and feeling since drilling processes enable to reduce those obstacles. 3rd grade students get used to practice calculation in their daily life, but they have difficulties if they deal with higher lesson, feeling obstacles or getting stuck to solve the problem.

Due to different students, 3rd grade students have different level of calculus mastery. Some only understand how to solve multiplication, while others know the answer without compute the number since they memorize the answer. Students who memorize the answer they can answer without any time to calculate more. Although students have the same lesson, they have different the way to get the lesson. Students have variety to grasp the lesson due to some factors is that 1) less doing drill in calculation; 2) they do not have any time to practice; 3) they get lazy to calculate, making them hard to achieve other levels.

Strategy to compute the math needs for students who learn basic math in elementary school so that they need more time to solve math calculation. When it comes to the math lesson that does not need any analyzing skills, the skill one enables to solve due to being used to do drilling. Some need more time, and they do not know the strategy to solve, becoming them to get difficulties. Based on the table states, there two categories are that A and B. Almost 50- 90% students who get point A are not interested in, do not have strategy and getting confused to do math problems, while students who get point B do not accept the lesson and having different level of math lesson. Those problems can be solved through drill method in which students train repeatedly.

Conclusion

This study concludes that students are more likely to improve their skills through drill method. Such students can think twice in drilling time in calculation. Students in 3rd who practice math repeatedly addressed to master in math skills. Almost a half of students in their stage rely on understand in math because of drilling time. However, students need more practice and forget about the math's formula. The more students practice in calculation, the more they are easier to understand.

REFERENCES

- Afifah, A., Parta, I. N., & Chandra, T. D. (2015). Penerapan Metode Penemuan Terbimbing untuk Meningkatkan Penalaran Matematika Siswa. *Tahun III, Nomor 1, Januari 2016*, 69, 22.
- Annisa, E. N., Supriyati, Y., & Nurani, Y. (2020). Peningkatan Pemahaman Berhitung dan Kardinalitas melalui Penggunaan Media Rangkasbitung. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 4(2), 665–675.
- Astuti, R. F., & Istiarini, R. (2020). Upaya Meningkatkan Kemampuan Membaca Permulaan Anak Usia 5-6 Tahun Melalui Media Puzzle di PAUD Flamboyan Sukasari Kota Tangerang. *Ceria: Jurnal Program Studi Pendidikan Anak Usia Dini*, 8(2), 31–43.
- Fitriyah, A., & Khaerunisa, I. (2018). Pengaruh penggunaan metode drill berbantuan permainan engklek termodifikasi terhadap kemampuan pemecahan masalah siswa kelas VII. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, 2(2), 267–277.
- Jogezai, N. A., Baloch, F. A., Jaffar, M., Shah, T., Khilji, G. K., & Bashir, S. (2021). Teachers' attitudes towards social media (SM) use in online learning amid the COVID-19 pandemic: the effects of SM use by teachers and religious scholars during physical distancing. *Heliyon*, 7(4), e06781.
- Kamil, B., & Olvatika, Y. P. (2015). Konseling Behavioral dalam Meningkatkan Konsentrasi Belajar Peserta Didik Sekolah Menengah Pertama Negeri 1 Hulu Sungkai Kabupaten Lampung Utara. *KONSELI: Jurnal Bimbingan Dan Konseling (E-Journal)*, 2(1), 29–36.
- Latorre, D. R., Kenelly, J. W., Reed, I. B., Carpenter, L. R., & Harris, C. R. (2007). *Calculus Concepts: An Applied Approach to the Mathematics of Change*. Cengage Learning.
- Malapata, E., & Wijayanigsih, L. (2019). Meningkatkan Kemampuan Berhitung Anak Usia 4-5 Tahun melalui Media Lumbung Hitung. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 3(1), 283–293.

- Maliki, M. (2017). *Analisis nilai-nilai pendidikan Islam dalam novel Api Tauhid karya Habiburrahman El shirazy*. UIN Sunan Ampel Surabaya.
- MATÍĆ, L. J. (2014). Non-mathematics students' reasoning in non-routine calculus tasks. *The Eurasia Proceedings of Educational and Social Sciences*, 1, 124–134.
- Misrawati, M., & Suryana, D. (2021). Bahan Ajar Matematika Berbasis Model Pembelajaran Tematik terhadap Kemampuan Berhitung Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(1), 298–306.
- Mulyani, D., Cahyati, N., & Rahma, A. (2020). Pengembangan Media Permainan Dakon Untuk Kemampuan Berhitung Anak. *Al-Athfaal: Jurnal Ilmiah Pendidikan Anak Usia Dini*, 3(2), 161–173.
- Nasution, S. P. (2019). Analisis Kesulitan Belajar dalam Memahami Kecemasan Peserta Didik pada Pembelajaran Matematika. *Desimal: Jurnal Matematika*, 2(1), 49–57.
- Neppala, P., Sherer, M. V., Larson, G., Bryant, A. K., Panjwani, N., Murphy, J. D., & Gillespie, E. F. (2018). An interactive contouring module improves engagement and interest in radiation oncology among preclinical medical students: Results of a randomized trial. *Practical Radiation Oncology*, 8(4), e190–e198.
- Nisa, T. F., & Karim, M. B. (2017). Profil Kemampuan Matematika Anak Usia Dini Melalui Learning to Think Different. *Jurnal PG-PAUD Trunojoyo: Jurnal Pendidikan Dan Pembelajaran Anak Usia Dini*, 4(2), 143–152.
- Pendidikan, M. (2016). Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 21 Tahun 2016 tentang Standar Isi Pendidikan Dasar dan Menengah. *Jakarta: Menteri Pendidikan Dan Kebudayaan Republik Indonesia*.
- Prahesti, V. D. (2020). The use of drill method to enhance curiosity pupils in speaking skill. *oxford: Journal of English Language Studies*, 1(1), 1–6.
- PRAHESTI, V. D. (2019). *Implementasi metode drill dalam pembelajaran matematika kelas v sekolah dasar islam bayanul azhar tulungagung*.
- Primayanti, G., Suwu, S. E., & Appulembang, O. D. (2018). Penerapan metode drill untuk meningkatkan kemampuan komunikasi matematis siswa kelas VIII SMP Lentera Way Pengubuan pada topik persamaan garis lurus [The implementation of the drill method to increase mathematical communication skills of grade 8 students]. *JOHME: Journal of Holistic Mathematics Education*, 1(2), 135–149.
- Samosir, D. (2020). Penerapan model contextual teaching and learning (ctl) untuk meningkatkan kemampuan berpikir kritis matematis siswa berbantuan aplikasi geometry calculator. *cartesius: Jurnal Pendidikan Matematika*, 3(1), 58–70.
- Sartika, D. (2019). Pentingnya pendidikan berbasis STEM dalam kurikulum 2013. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, 3(3).
- Sayekti, T. (2020). Peningkatan keterampilan berhitung siswa melalui media kotak ajaib berbasis stem pada materi konsep penjumlahan. *Jurnal Pendidikan Dasar*, 11(1), 10–19.
- Siadi, K., Mursiti, S., & Laelly, I. N. (2009). Komparasi hasil belajar kimia antara siswa yang diberi metode drill dengan resitasi. *Jurnal Inovasi Pendidikan Kimia*, 3(1).
- Sudiyono, S. (2006). *Strategi pembelajaran partisipatori di perguruan tinggi*. UIN-Maliki Press.
- Wahyuni, A. (2017). Analisis hambatan belajar mahasiswa pada mata kuliah kalkulus dasar. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 1(1), 10–23.
- Wardhani, D. K. (2017). Peran guru dalam menerapkan pembelajaran matematika yang menyenangkan bagi anak usia dini. *Jurnal Paud Agapedia*, 1(2), 153–159.
- Wewe, M., & Kau, H. (2019). Etnomatika bajawa: kajian simbol budaya bajawa dalam pembelajaran matematika. *Jurnal Ilmiah Pendidikan Citra Bakti*, 6(2), 121–133.