Application of Educational Game-Based Online Learning Media in Improving Mathematical Communication Skills

Sutio  
SD Negeri Simpang Sari  
Corresponding Email: gmail@gmail.com

Abstract:  
This research is motivated by the low mathematical communication skills about the material of circle elements in the second-grade students of SD Negeri Simpang Sari. This is because online teaching and learning activities are less effective and students' perceptions of the difficulty of learning Mathematics, thus making students less mathematical communication skills when learning Mathematics online. Therefore, researchers make improvements to learning using online learning media based on educational games which are expected to be a solution to the problems found.  
The objectives of this study are: 1) Describe the application of online learning media based on educational games in improving mathematical communication skills in second-grade students of SD Negeri Simpang Sari. 2) Describe the improvement of mathematical communication skills after the implementation of online learning media based on educational games for second-grade students of SD Negeri Simpang Sari.  
The classroom action research model chosen is the Kurt Lewin model which consists of two cycles with four stages in each cycle, namely planning (implementation), acting (action), observing (observing), and reflecting (reflection). Data collection techniques used are interviews, observations, tests, and virtual documentation.  
The results showed that: 1) The application of online learning media based on educational games can increase the activities of teachers and students, as evidenced by the results of teacher observations in the first cycle of 88.63 (good) which then increased to 97.72 (very good) in the second cycle. This is also supported by the increase in the results of student observations in the first cycle of 65 (less) which then increased to 90 (very good) in the second cycle. 2) The improvement of mathematical communication skills in the material of circle elements using online learning media based on educational games has increased. This can be seen from the average value in the pre-cycle of 70 (enough) with the percentage of completeness of mathematical communication skills by 46%, in the first cycle, it became 78.15 (enough) with the percentage of completeness of mathematical communication skills of 65%, then increased in cycle II to 90.03 (very good) with a percentage of completeness of 85%.

Keywords:  
Educational Game  
Online Learning Media  
Mathematical Communication Skill
INTRODUCTION

Mathematics is included in the subjects that need to be taught at every level of education. In learning mathematics, students are guided to be able to think critically, systematically, logically, and be able to communicate ideas properly and correctly. Several mathematical abilities need to be improved by students, including problem-solving (problem-solving), tracing patterns or relationships (connections), reasoning power (reasoning), understanding concepts and representations (representation), and communication (communication). These abilities are in line with 21st-century educational theory in improving the elementary school curriculum which includes 4C (Critical Thinking and Problem Solving, Collaboration, Creativity and Innovation Communication). Thus the purpose of learning is not only the transfer of material but also the mastery of skills. Referring to mathematical ability, one of the important components in realizing the learning objectives of mathematics is mathematical communication skills.

According to NCTM (The National Council of Teachers of Mathematics), the mathematical communication skills that are important for students to have are four standard processes that are useful in basic mathematical skills and knowledge, namely problem solving, reasoning, connection, and communication. An online journal called the Ontario Ministry of Education also states about mathematical communication skills as follows: "communication is an essential process for learning mathematics because through communication, students reflect upon, clarify and explain their ideas and understanding of mathematical relationships and mathematical arguments". Without good communication, the development of mathematics will be hampered. Students' mathematical communication skills can be interpreted as students' skills in conveying what they know. Things that are known can be in the form of materials, concepts, formulas, or strategies for solving a problem in learning mathematics.

Mathematical communication skills also require students to be able to read and absorb information, express their thoughts in writing and orally, and think critically about mathematical ideas. Thus, students need to get mathematical communication to make it easier to understand and interpret the problem to present the problem in the form of graphs, tables, or language.
In today's mathematics learning, there is a reality that is not in line with expectations, namely the lack of students' mathematical communication skills in the field. These problems are caused by many factors, including models, strategies, methods, or learning media that do not attract the attention of students. However, the biggest problem right now is that due to the COVID-19 pandemic which is endemic in all parts of the world including Indonesia, the government has issued a policy of limiting public interaction or physical distancing and Work From Home (WFH). So that requires educational institutions to take students off, then transfer the teaching and learning process which was originally at school to be at home or commonly referred to as online or online learning.

Online learning should be able to make all elements of education become technology literate by knowing various face-to-face applications. However, the lack of readiness, facilities, and infrastructure cause many negative impacts, namely, the interaction between teachers and students is less than optimal due to the lack of communication tools owned by students. The increasing need for internet quotas also harms underprivileged parents and students feel bored when doing many tasks, sometimes even the teacher's explanation is paused when the signal is bad through face-to-face applications.

During this online learning, he used several media such as the Google Meet application, the Bandicom application, the Discord application, YouTube videos, and WhatsApp. The use of some of these media has complaints or obstacles, namely, only 17 of 26 students take part in online learning. One of the factors is that the cellphones used belong to parents who must be brought to work so that some students cannot actively participate in online learning. This also means that there are no companions for some students when learning online or online. These problems have an impact on the limitations of teachers in improving the mathematical communication skills of students who are not actively participating in online learning.

The teacher's statement was in line with the low level of students' mathematical communication skills when the researchers conducted a pre-cycle test of the circle elements through the google form application to 26 Class II students at SD Negeri Simpang Sari on September 23, 2020. The results of the test showed that there were 14 students. students who cannot identify the elements of a circle completely, accurately, and fluently so that they have a low level of
mathematical communication skills. These results are known from the answers of students who show that most of them still cannot distinguish between a bowstring with a diameter, or a radius with an apothem, and a jurying area with a segmented area. Whereas for the capacity of sixth graders who have studied the material, most of them should be able to remember and identify the eight elements of a circle correctly.

Some students also said that learning mathematics in class was difficult, especially with distance learning, so they found it difficult to learn mathematics online. Distance learning makes students need time to adjust to new changes that will affect their learning absorption. Not only that, because schools are closed for too long it will make students feel bored at home because they cannot interact with their friends at school. They also feel that the media used by the teacher is not supportive in learning mathematics, because they only do video conferences using google meet and WhatsApp every morning and there is no repetition for those who don’t follow them because the cellphones they use are brought by their parents to work. So that students who do not follow Google Meet miss the material being taught.

Efforts or solutions that researchers can offer to minimize the negative impact of online mathematics learning are using online learning media that can improve mathematical communication and are used by all students, both those who follow and who do not have time to attend Google Meet and can eliminate the boredom of students who miss interacting with students. teacher and friends. One type of interactive learning media that is suitable for online learning is learning media through games or games. Because games can function as entertainment so that children become happier in learning, they can also play and learn at the same time and be flexible anytime and anywhere. So that it is easier for teachers to observe the mathematical communication skills of all students through the scoreboard in the educational game.

This agrees with Henry in his book which states that the positive impact of using games is entertaining as well as a means of practice for solving problems and logic so that they are accustomed to actively thinking and practicing even though they are at home. These learning media can be called online learning media based on educational games that can support some of the mathematical abilities and skills of students during online learning, including mathematical communication skills.

THEORETICAL FRAMEWORK
Understanding Online Learning Media

Media comes from the Latin "medius" which means middle or intermediary. The word media comes from the word wassail which means introduction in Arabic. Meanwhile, the world media in the Big Indonesian Dictionary (KBBI) has the meaning of means of communication such as magazines, television, newspapers, radio, posters, banners, and films.

Based on the meaning of the media from the various languages, it can be concluded that the notion of media is an introduction or means to present information. The word media referred to in this study is the media used in learning. The following is an explanation of experts about the meaning of learning media.

a. Robert Mills Gagne in the book Wina Sanjaya said that learning media are various elements that are interesting and relevant to students that can stimulate them to learn.

b. Gerlach & Ely in Azhar Arsyad’s book has an opinion about the meaning of learning media, namely material (textbooks), events (school environment), or humans (teachers) that help students acquire knowledge, skills, and attitudes.

c. Yusufhadi Miarso in Azhar Arsyad’s book states that everything that can be used to convey messages to stimulate the feelings, thoughts, willingness, and attention of students to learn is an understanding of learning media.

d. The Nation Education Association (NEA) in Asnawir’s book explains the notion of learning media as all objects that can be accepted by the human senses in terms of teaching and learning.

Based on the opinions of these experts, it can be concluded that learning media are all relevant components around the students' environment so that they can convey various information during the learning process. Learning media can also be two-way interactive communication between teachers and students.

However, several problems are facing the world of education today due to the Work From Home policy during the COVID-19 pandemic. This requires the school component to prepare teaching and learning activities online or online. Therefore, teachers are required to create online learning media.

According to Dabbagh and Ritland in Novita Arnesi’s book, online learning is an open learning system through the internet and network-based technology to facilitate the learning process. Online learning media can also be interpreted as media that can be operated and
accessed according to user needs, for example, to download material sources for circle elements.

Thus, online learning media are learning media that use the internet or networks which are commonly referred to as online learning media. The advantage of using online learning media is that learning is independent, providing more learning experiences in the form of text, audio, video, games, quizzes, or animations that can convey information. So that teachers and students can deliver, update material content, download, send comments in online discussion rooms such as Whatsapp groups, video conference links to communicate directly.

Educational Games

According to Muhammad Ali in his thesis, he stated that educational games mean digital games using interactive multimedia technology used for educational enrichment. In line with this, the definition of educational games according to Handriyani in her research report is a game that is used to stimulate and increase concentration and solve a problem. Educational games can also be interpreted as media used to provide teaching, increase knowledge through unique and interesting media. According to Edward in Handriyani’s research report, educational games are a combination of structured learning with game characteristics that can increase the motivation and knowledge of players.

Based on this description, it can be concluded that educational games are games that play a role in the learning process and contain components that attract the attention of students to be more active in learning as well as a means of entertainment.

Mathematical Communication Skills

Mathematics is the science of numbers, be it the relationship between numbers or the methods used in solving problems regarding numbers. Mathematics is a form of communication that is close to perfection because mathematics is a language that is symbolized by various numbers, images, symbols, graphs, or tables that have hidden meanings or meanings. Without this, it can be said that mathematics is just a collection of dead formulas. Therefore, mathematics is not just a tool for thinking but can be used as a tool to convey ideas clearly and precisely. Students can express their ideas orally or in writing through pictures, symbols, graphs, or tables which is commonly referred to as
mathematical communication. Some definitions of mathematical communication skills according to experts are as follows.

a. Afgani stated that mathematical communication is the ability of students to listen, read, write, examine, and evaluate mathematical ideas, symbols and information.

b. Greenes and Schulman state that mathematical communication skills are when students can express, interpret, assess, construct and relate various mathematical ideas, through written, oral, demonstration, and visually depicting them.

Based on the opinions of the experts above, it can be concluded that mathematical communication skills are students' skills in expressing or expressing mathematical ideas through written and oral mathematical terms, models and symbols.

RESEARCH METHODOLOGY

This type of research uses the CAR design, namely classroom action research. Classroom Action Research (CAR) in terms of its name already shows the content contained in it, namely research conducted in the classroom. CAR is a research activity to observe the learning activities of a group of students using treatments or actions that are deliberately raised to achieve the goal of improving and improving the quality of learning. CAR was chosen in this study because the authors wanted to improve the quality of learning specifically in terms of improving the mathematical communication skills of students at SD Negeri Simpang Sari. This research is designed to help teachers find out what is happening in their virtual classroom in online learning. The information obtained by the teacher will be taken into consideration in making decisions related to the learning media that will be applied. This CAR aims to improve teacher professionalism, students' mathematical communication skills, the classroom, and the school as a whole.

This classroom action research combines qualitative and quantitative research. The implementation of this classroom action research uses the Kurt Lewin Model, the main concepts of action research are as follows.

1. Planning (planning)
2. Action (acting)
3. Observation (observing)
4. Reflection

The relationship of the four components is seen as a cycle. To solve problems in the classroom, may take more than one cycle. These
cycles are interrelated and continuous. The research variables that are used as target points to answer the problems faced are as follows:

1. **Input Variables**: Class II students of SD Negeri Simpang Sari.
2. **Process Variables**: Application of online learning media based on educational games.
3. **Output Variables**: Improved mathematical communication skills of circle elements.

Sources of data in this study include:

1. Learners: To get data about mathematical communication skills.
2. Teachers: To see the success rate of applying online learning media for mathematics teachers based on educational games in improving mathematical communication skills in the material of circle elements.

Researchers used several data collection techniques such as observation, interviews, tests, and documentation. This data collection technique is aimed at teachers and students. This is intended to obtain true and accurate data in this study.

**FINDING**  
**Pre-cycle**

| No. | Student Initials | Identify Score | Drawing Score | Score | Explanation |
|-----|------------------|----------------|--------------|-------|-------------|
| 1   | ACAZ             | 60             | 75           | 68    | Not Passed  |
| 2   | AAS              | 40             | 75           | 58    | Not Passed  |
| 3   | AYR              | 100            | 100          | 100   | Passed      |
| 4   | ARN              | 80             | 80           | 80    | Passed      |
| 5   | AAF              | 40             | 50           | 45    | Not Passed  |
| 6   | AN               | 80             | 90           | 85    | Passed      |
| 7   | AR               | 40             | 75           | 58    | Not Passed  |
| 8   | AM               | 60             | 80           | 70    | Not Passed  |
| 9   | ARP              | 100            | 75           | 88    | Passed      |
| 10  | FSF              | 100            | 80           | 90    | Passed      |
| 11  | GPI              | 40             | 50           | 45    | Not Passed  |
| 12  | GIR              | 100            | 75           | 88    | Passed      |
| 13  | IAS              | 80             | 80           | 80    | Passed      |
| No. | Student Initials | Mathematical Communication Skills Score | Score | Explanation |
|-----|------------------|----------------------------------------|-------|-------------|
|     |                  | Written test | Verbal test |       |             |
| 1   | ACAZ             | 65          | 75          | 70   | Not Passed  |
| 2   | AAS              | 70          | 90          | 80   | Passed      |
| 3   | AYR              | 100         | 100         | 100  | Passed      |
| 4   | ARN              | 80          | 100         | 90   | Passed      |
| 5   | AAF              | 55          | 85          | 70   | Not Passed  |
| 6   | AN               | 80          | 85          | 83   | Passed      |
| 7   | AR               | 45          | 50          | 48   | Not Passed  |
| 8   | AM               | 80          | 80          | 80   | Passed      |
| 9   | ARP              | 100         | 80          | 90   | Passed      |
### Recapitulation of Student Test Assessment Results in Cycle I

| No. | Student Initials | Mathematical Communication Skills Score | Explanation |
|-----|------------------|----------------------------------------|-------------|
| 10  | FSF              | 100 100 100 | Passed |
| 11  | GPI              | 90 75 83 | Passed |
| 12  | GIR              | 90 80 85 | Passed |
| 13  | IAS              | 100 100 100 | Passed |
| 14  | JP               | 55 50 53 | Not Passed |
| 15  | MRK              | 65 75 70 | Not Passed |
| 16  | MRBF             | 90 75 83 | Passed |
| 17  | MISH             | 75 75 75 | Not Passed |
| 18  | NU               | 78 80 79 | Passed |
| 19  | NMK              | 100 80 90 | Passed |
| 20  | PPA              | 90 100 95 | Passed |
| 21  | RAD              | 88 90 89 | Passed |
| 22  | RMJ              | 45 50 48 | Not Passed |
| 23  | SB               | 55 75 65 | Not Passed |
| 24  | TB               | 78 80 79 | Passed |
| 25  | WPSF             | 45 50 48 | Not Passed |
| 26  | ZAFAR            | 78 80 79 | Passed |

Total: 2032
Average: 78,15

78,15
Passing Grade: 79
Total Passed: 17
Total of Not Passed: 9
Classical Percentage: 65%

---

**Cycle 2**

**Table 3**

| No. | Student Initials | Mathematical Communication Skills Score | Explanation |
|-----|------------------|----------------------------------------|-------------|
|     |                  | Written Test Verbal Test |         |
| 1   | ACAZ             | 95 90 93 | Passed |

160
|    |    |    |    |               |
|----|----|----|----|--------------|
| 2  | AAS| 90 | 90 | 90           | Passed   |
| 3  | AYR| 100| 100| 100          | Passed   |
| 4  | ARN| 93 | 100| 97           | Passed   |
| 5  | AAF| 80 | 90 | 85           | Passed   |
| 6  | AN | 95 | 100| 98           | Passed   |
| 7  | AR | 83 | 90 | 87           | Passed   |
| 8  | AM | 90 | 100| 95           | Passed   |
| 9  | ARP| 100| 100| 100          | Passed   |
|10  | FSF| 100| 100| 100          | Passed   |
|11  | GPI| 90 | 80 | 85           | Passed   |
|12  | GIR| 100| 80 | 90           | Passed   |
|13  | IAS| 100| 100| 100          | Passed   |
|14  | JP | 68 | 80 | **74**       | Not Passed |
|15  | MRK| 75 | 100| 88           | Passed   |
|16  | MRBF| 90 | 100| 95           | Passed   |
|17  | MISH| 100| 90 | 95           | Passed   |
|18  | NU | 100| 100| 100          | Passed   |
|19  | NMK| 100| 100| 100          | Passed   |
|20  | PPA| 90 | 100| 95           | Passed   |
|21  | RAD| 95 | 90 | 93           | Passed   |
|22  | RMJ| 55 | 80 | **68**       | Not Passed |
|23  | SB | 68 | 75 | **72**       | Not Passed |
|24  | TB | 93 | 80 | 87           | Passed   |
|25  | WPSF| 45 | 75 | **60**       | Not Passed |
|26  | ZAFAR| 88 | 100| 94          | Passed   |

Total: 2342
Average: 90,03

90, 03
Passing Grade: 79
Total Passed: 22
Total of Not Passed: 4
Classical Percentage: 85%
Recapitulation of Student Test Assessment Results in Cycle II

Discussion

Cycle 1

In the first cycle, virtual classroom action research conducted through the application of online learning media based on educational games has not been said to be successful. This is based on several assessment results that do not meet the specified minimum completeness standards. The minimum completeness for teacher and student activities is 80. The results of teacher activity observations obtained in the first cycle have reached 88.63. The results of observations of teacher activities obtained have exceeded the minimum expected completeness. However, regarding the results of student activities in cycle I, it is still at number 65. This means that the value has not reached the expected minimum completeness. Likewise, the percentage of completeness is still at 65%, while the minimum completeness that must be achieved is at least 80%, so further activities are needed to improve and increase the results obtained.

In the learning process in cycle I, only 15 out of 26 students attended the google meet in the morning, then there were still some students who did not focus their attention on the learning activities delivered by the teacher and the lack of time management during the learning process. The existence of deficiencies in the activities of these students can come from the teacher or the students themselves. From the teacher's point of view, the possibility that can cause students not to pay attention is the power of the teacher's voice which is sometimes still not heard until some students are still sleepy. While the possible cause of the student's factors is because students do have difficulty concentrating. However, students turned out to be very happy and excited when doing activities using online learning media based on educational games which caused students to pay less attention to time. So that the teacher passes the allotted time and takes up further online learning time.

Cycle II

In the second cycle, both the results of observations of teacher activities, the results of observations of student activities, and the percentage of learning completeness both experienced an increase from the previous cycle. In the second cycle of teacher activity observations obtained results of 97.72. Then the observation of student activities
reached 90 results. Likewise, the percentage of completeness had reached 85% (good). Based on these results, it can be said that the application of online learning media based on educational games has succeeded very well in improving mathematical communication skills in the material of circle elements because all aspects requested have reached and even exceeded their respective minimum mastery.

The success of learning in cycle II can be achieved because of efforts to improve on the deficiencies that are still found in the implementation of the cycle I. The deficiencies that are corrected in cycle II include the lack of strong voices issued by the teacher, the lack of concentration of some students on the learning activities delivered by the teacher. As well as improvements in managing time in learning so that it does not take up further online learning time. The increase in the number of students who took part in the google meet in the morning was 22 out of 26 students.

Table 4

| No | ASSESSMENT CRITERIA | PRE CYCLE | CYCLE I | CYCLE II |
|----|---------------------|-----------|---------|----------|
| 1. | Teacher Activity Observation Value | - | 88.63 | 97.72 |
| 2. | Student Activity Observation Score | - | 65 | 90 |
| 3. | Average value | 70 | 78.15 | 90.03 |
| 4. | Percentage of Complete Learning | 46% | 65% | 85% |

Comparison Results of Each Cycle Improvement

The improvement of mathematical communication skills as can be seen in Table 4.10 above, can be achieved due to the application of online learning media based on educational games. This is supported by the theory put forward by Henry in his book about the positive impact of using educational games, one of which is fun and entertaining as well as providing exercises to solve problems and logic so that they are accustomed to actively thinking, learning, and practicing even though they are at home.

CONCLUSION

Based on the results of research and discussion on the application of online learning media based on educational games in improving students' mathematical communication skills in Mathematics subject matter of circle elements in Class II SD Negeri Simpang Sari, it can be concluded:
1. The application of online learning media based on educational games which are expected to improve students' mathematical communication skills in the Mathematics subject matter of the elements of this circle is going well. This can be seen from the results of the observation value of teacher activities in the first cycle of 88.63 to 97.72 in the second cycle. Similarly, the observation of student activities, which was 65 in the first cycle, then became 90 in the second cycle.

2. The mathematical communication skills of students in the Mathematics subject of circle elements through online learning media based on educational games in Class II SD Negeri Simpang Sari also increased. This is evidenced by the pre-cycle average score of 70 and the percentage of mathematical communication skills completeness in the pre-cycle at 46%, then in the first cycle, the average value increased to 78.15 and the percentage of mathematical communication skills completeness to 65%, then experienced an increase again so that the average value reaches 90.03 and the percentage of mathematical communication skills completeness reaches 85% in the second cycle.

REFERENCES
Ali, M. (2015). Game Edukasi 3D Mengumpulkan Sampah di Labirin Berbasis Desktop dengan Implementasi Fuzzy Logic. Skripsi. Batam: Politeknik Negeri Batam. t.d.

Apiyati, S. (2015). Penggunaan Model Pembelajaran Kooperatif Tipe Student Teams Achievement Division (STAD) dalam Upaya Meningkatkan Kemampuan Komunikasi Matematis Pada Pokok Bahasan Pecahan. Jurnal Cakrawala Pendas Vol. I, No. 2.

Arifin, Z. (2012). Penelitian Pendidikan: Metode dan Paradigma Baru. Bandung: PT Remaja Rosdakarya.

Arsyad, A. (1997). Media Pembelajaran. Jakarta: PT Grafindo Persada. Asnawir dan Basyiruddin Usman. 2002. Media Pembelajaran. Jakarta: Ciputat Pers.

Jauhar, F dan Hamam. (2012). Teori Praktik Penelitian Kelas (PTK) Buku Berbasis Riset. Tulungagung: STAIN Tulungagung Press.
Kamus Besar Bahasa Indonesia, Pengertian Media, (diakses pada tanggal 25 September 2020 pukul 21:41 WIB), [https://kbbi.web.id/media](https://kbbi.web.id/media).

Kamus Besar Bahasa Indonesia, Pengertian Edukasi, (diakses pada tanggal 25 September 2020 pukul 22:40 WIB), [https://kbbi.web.id/media](https://kbbi.web.id/media).

KBBI Online Oleh Epta Setiawan, 2019 Versi 2.8, pengertian keterampilan, (diakses pada tanggal 18 Maret 2020 Pukul 08.00 WIB), [https://kbbi.web.id/terampil](https://kbbi.web.id/terampil).

Ontario Ministry of Education. (2010). The Capacity Building Series. The Literacy and Numeracy NN, Website Game Edukasi, (diakses pada tanggal 8 Oktober 2020 pukul 13.20 WIB), [http://wordwall.net/](http://wordwall.net/).

National Council of Teachers of Mathematics. 2000. 4 Principles and Standar for School Mathematics. The National Council of Teachers of Mathematics.

Novita, A., dan Abdul Hamid K. (2015). Penggunaan Media Pembelajaran Online – Offline dan Komunikasi Interpersonal Terhadap Hasil Belajar Bahasa Inggris. Jurnal Teknologi Informasi & Komunikasi dalam Pendidikan Vol. 2, No. 1.

Nur, M., Ikhsan & Said Munzir. (2015). Peningkatan Kemampuan Komunikasi dan Penalaran Matematis Siswa Madrasah Aliyah melalui Model Pembelajaran Kooperatif Tipe Teams Games Tournament. Jurnal Didaktik Matematika Vol. 2, No. 1.

Nurhayati, E. (2020). Meningkatkan Keaktifan Siswa dalam Pembelajaran Daring Melalui Media Game Edukasi Quiziz pada Masa Pencegahan Penyebab

Sudi, P. Identifikasi Indikator Kemampuan Komunikasi Matematis Siswa dalam Menyelesaikan Soal Matematika Berjenjang pada Tiap-tiap Jenjangnya, (diakses pada tanggal 7 September 2020 pukul 08.00 WIB), [fmipa.u.ac.id/index.php/component/attachments/download/ 158. Html](fmipa.u.ac.id/index.php/component/attachments/download/ 158. Html).

Sugiyono. (2008). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R & D. Bandung: Alfabeta.

Syafuddin, M. dkk. (2018). Senang Belajar Matematika Kelas II Kurikulum 2013 Revisi 2018. Jakarta: Kementerian Pendidikan dan Kebudayaan.
Syaodih S, Nana. Metodologi Penelitian Pendidikan. Bandung: PT Remaja Rosdakarya.

Uchjana, E. O. (1997). Ilmu Komunikasi Teori dan Praktek. Bandung: PT. Remaja Rosdakarya.

Umar, W. (2012). Membangun Kemampuan Komunikasi Matematis Dalam Pembelajaran Matematika. Infinity Jurnal Ilmiah Program Studi Matematika STKIP Siliwangi Bandung Vol 1, No.1 W. Widjaja, A. Ilmu Komunikasi. Jakarta: Rineka Cipta.

Wiryanto. Mei 2020. Proses Pembelajaran Matematika di Sekolah Dasar di Tengah Pandemi COVID-19. Jurnal Review Pendidikan Dasar Vol. 6 No. 2.

Zainab Aqib dan Ahmad Amrullah. 2018. PTK Penelitian Tindakan Kelas Teori & Praktek. Yogyakarta: Penerbit Andi.