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Mathematical Calculation Skills: Application of Project-Based Learning Models in Grade IV at MIS Assu'udiyah Bungo

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Abstract
The class action improved for fourth-grade students at MIS Assu'udiyah Bungo, which has 29 students. Based on the initial observation, the students' math calculation skills were still low. This was shown through the learning process, which did not meet the Merdeka Curriculum requirements. The average math calculation test results for the first semester were still below the school's standard, 75%. The average score was below the target achievement criteria (KKTP) set by the school. The research method used was PTK (Class Action Research). The research was conducted in two cycles, each consisting of planning, implementation, observation, and reflection. The results obtained from the research include: 1) the implementation of the Project-Based Learning model for the material on pictograms and bar charts was categorized as very good. The teacher's assessment of the process increased from 97. 06% in cycle I to 100% in cycle II, an increase of 2. 94%, with a final percentage of 100%. Meanwhile, the student's process increased from 69. 37% in cycle I to 81.4% in cycle II, an increase of 12. 03%, with a final percentage of 81. 4%. Thus, the results achieved the success indicators of the process, which was 76%. 2) The students' math calculation skills on the material of pictograms and bar charts improved above the KKTP of 75% after the implementation of the Project-Based Learning model. The learning outcomes for the students in cycle I were 68. 96%, and in cycle II, they reached 93.10%. It can be concluded that from the initial observation to cycle II, there was an increase of 61%.

Keywords:
calculation ability; mathematics; model *Project-Based Learning*; madrasah ibtidaiyah; action research

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1 Introduction

Ability is the ability or potential of a person to face and adapt to new situations quickly and effectively, especially in students who are learning to change their physical and mental behavior. Counting is a part of mathematics, and everyone needs to develop counting skills that are often used in everyday life. Counting is a way of learning with numbers, using these numbers to determine the number of objects (Marselani, 2019). Counting ability is the ability to operate real numbers in the form of numbers, especially those related to addition, subtraction, multiplication, and division

(Meutia, 2017). An improvement to introduce mathematical science about the properties and relationships of real numbers and their calculations, especially number operations that are very basic, such as addition, subtraction, multiplication, and division. Sebuah peningkatan untuk memperkenalkan ilmu matematika tentang sifat-sifat dan hubungan bilangan Real-world problems and calculations, especially very basic number operations such as addition, subtraction, multiplication, and division. Children aged 7 to 11 are at the concrete operations stage of mathematical ability. Children at this age should be provided with learning models to help them understand the mathematics taught by their teachers (Rahmi, 2020).

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Mathematics comes from the Latin word "manthanein" or "mathema," meaning to learn or something studied. In Dutch, it is called "Wiskunde," or exact science. Teachers design mathematics learning to develop students' creative thinking and improve their ability to construct new knowledge and experiences. Mathematics learning activities in elementary schools are designed based on the principles of "playing while learning" and "learning while playing" (Damayanti *et.al*, 2024). Mathematics is an important subject in education. This is because learning to count in mathematics is essential in everyday life, especially in shopping transactions, where every human activity is always related to mathematics (Hidayah *et.al,* 2024). Mathematics is a science that discusses order. In the early learning process, mathematics uses inductive thinking to assist students. Mathematics aims to enable students to think more critically and logically when performing calculations. By learning mathematics, students can discover and understand new ideas, recognize specific patterns, and solve various problems (Fiana, *et.al*, 2019).

Based on observations conducted by the author on Monday, October 21-28, 2024, in grade IV of MIS Assu'udiyah Bungo, several obstacles were identified in mathematics learning. One particularly striking issue was students' low numeracy achievement. This was evident in the odd-semester exam scores, where only 41.4% of students achieved the minimum competency (KKTP) and 58.6% did not. This situation reflects that the numeracy learning process has not been effective, thus affecting students' understanding of the material and impacting their odd-semester exam scores. This condition was evident in the odd-semester exam results, where most students had not understood the subject matter sufficiently.

One of the causes is a lack of student focus on learning, and students are not treated enough in group learning, so they have difficulty understanding the lesson in depth. The learning process in grade IV MIS Assu'udiyah Bungo is still dominated by the role of the teacher, which makes learning take place one-way and students only as listeners, not as active participants in learning activities. This situation is clearly visible during the learning activities, where students show a less active attitude, seem to have difficulty understanding the questions given by the teacher, and are busier playing in the back with their friends. When the teacher allows asking questions about material that is not yet understood, not a single student raises their hand or dares to ask. Hence, the classroom atmosphere becomes less interactive. This lack of active participation causes the learning process to be less than optimal, which ultimately has an impact on low student learning achievement.

The lack of implementation of innovative and fun learning models is one factor in the low student interest in learning mathematics. To overcome this problem, teachers must create an enjoyable and non-boring learning atmosphere to foster student interest and enthusiasm for the subject. One way to do this is by utilizing engaging learning models that can directly involve students in the learning process, such as the Project-Based Learning model, which involves students directly in the learning process while participating. Play, so that students can learn in a more interactive, fun, meaningful way, and share the thoughts of their friends.

Therefore, researchers chose to apply mathematical learning numeracy skills using the Project-Based Learning model. This learning model is designed to encourage students' numeracy skills and increase students' creativity in the learning process by producing a work. Students' work is helpful for the continuity of student learning (Febiola, 2020). In its implementation, this model involves

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students in collecting data that will be used in making projects. This approach aims to show that project-based learning can induce student creativity, improve students' critical thinking, rational understanding, improve understanding of educational materials, and provide students with real-world experiences (Kuncoro *et.al*, 2023). This model involves student collaboration, communication, and creativity, and provides opportunities to apply the concepts they have learned in real-world situations. PjBL in elementary school classes provides opportunities for students to learn more actively and practically through engaging and relevant projects (Paus, J et.al, 2023). The learning process carried out by implementing the project-based learning model takes place actively. Students will be more proactive in answering questions from the teacher (Zahara, 2023). The learning process of the project-based learning model has six syntaxes according to (Paus, J *et.al*, 2023) First, the teacher begins the lesson with essential questions; second, designing a project plan, the teacher provides LKPD/project sheets that students will use to collect data for project creation; third, making a schedule, the teacher provides a time limit for project work; fourth, monitoring students and monitoring project progress, the teacher monitors during the project; fifth, testing the results, the teacher asks each group to present their work in front of the class; sixth, evaluating experience, the teacher reflects on the learning that has been learned both individually and in groups.

This PjBL learning model has never been implemented by teachers in grade IV MIS Assu'udiyah Bungo. Therefore, by applying this model in learning mathematical numeracy skills, it is hoped that students can experience a more meaningful and enjoyable learning experience and be encouraged to be actively involved in the learning process. The application of this model also aims to improve students' numeracy skills, which ultimately contributes to improving the quality of the overall mathematical numeracy learning process. Based on the described problems presented previously, this research focuses on efforts to improve the ability to calculate mathematics learning through applying the Project-Based Learning model in class IV MIS Assu'udiyah Bungo.

2 Method

The researcher used a Classroom Action Research (CAR) design based on the opinion (Sari & Mudrikah, 2024). This research was conducted through a series of steps (figure 1), including the planning stage, which includes the materials used during the learning process; the implementation stage, which includes the learning process activities; the observation stage; and the reflection stage, which assesses and improves unachieved grades for improved implementation.

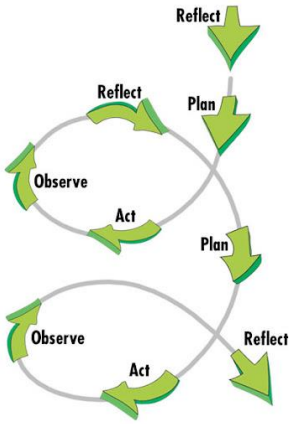

Figure 1. Classroom Action Research Cycle

According to (Machali, 2022)CAR aims to improve classroom learning practices as a format for reviewing or studying self-reflection surveys by participants in education (teachers or principals). This classroom action research was conducted in the even semester of the 2024/2025 academic

year, specifically from May 21 to 31, 2025, in class IV of MIS Assuudiyah Bungo, with 29 students. The research activities were conducted in two action cycles, each with two learning meetings. Each cycle was designed to observe, evaluate, and improve the learning process by applying the Project-Based Learning model to increase student engagement in learning mathematical numeracy skills.

Researchers used two main techniques in the data collection process: observation and testing. The tests were divided into two types: arithmetic ability test sheets and arithmetic ability test questions. The instruments used included observation sheets for teachers and students, as well as arithmetic ability test sheets and arithmetic ability test questions. The observation sheets were used to assess the extent to which the implementation of the Project-Based Learning model proceeded according to plan regarding teacher and student activities. Meanwhile, the arithmetic ability test sheets and arithmetic ability test questions served as measuring tools to assess students' level of learning mastery in mathematics after being given interventions in each cycle

The collected data were then processed using descriptive statistical data analysis methods. This technique was used to more clearly understand and describe the learning process data and information from the teacher and student observation sheets. This analysis helped to understand how the learning process took place, the extent of student and teacher involvement, and the developments during the activities. Specific formulas were used to calculate and present data in an easily understood format to support the analysis process. Formula 1: (1) determines the learning process, (2) determines the student's score, and (3) determines the student's score. Classified according to the provisions listed in Table 1 (Sandrayati, 2021) Analysis of the test score data of the numeracy sheet is used to analyze the data of the students' mathematical numeracy test scores using formula 2 to determine the success of the numeracy test sheet achieved, as shown with the provisions listed in Appendix A1-A4 (Muharyati *et.al*, 2021) An analysis of the test score data of the numeracy questions is used to analyze the data of the students' mathematical numeracy test scores using formula 3 (Daupela *et.al*, 2024) Classical formula four can be used to calculate the value of the increase in students' mathematical numeracy test questions. (Badraeni *et.al*, 2020) Which is as follows:

$$\mathrm{N} = \frac{\text{Score achieved}}{\text{Maximum scre}} \times 100\% \qquad (1)$$

Table 1. Learning process assessment categories

Range of values	Category
85-100	Excellent
70-84	Good
55-69	Sufficient
40-54	Poor
0-39	Very poor

Table 2. Categories of assessment of students' success in mathematical calculation ability tests

Range of values	Category
86-100	Excellent
75-85	Good
60-74	Sufficient
55-59	Poor
≤ 54	Very poor

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3 Results and Discussion

3.1 Results

This study presents comprehensive data on implementing the PjBL learning model in the learning process in grade IV of MIS Assu'udiyah Bungo. Classroom action research activities were carried out through two cycles, each consisting of two meetings. Cycle I was implemented on May 21 and 22, 2025, while Cycle II was carried out on May 28 and 31, 2025. Each stage in the cycle was designed for planning, implementation, observation, and reflection to improve the quality of learning continuously. During the learning process, teaching activities carried out by the teacher were observed by the fourth-grade homeroom teacher, who acted as an observer, using the teacher observation sheet as an assessment tool. Every teacher's teaching activity directly influences students' understanding of the subject matter. The teacher performance results during the learning process can be seen in detail in Table 3.

Table 3. Teacher Observations

No	Cycle I	Percentage %	Cycle II	Percentage %
1	meeting 1	94,12%	meeting 1	100%
2	meeting 2	100%	meeting 2	100%

Based on Table 3, the percentage of teacher engagement in the teaching process shows an increase of 2.94% from Cycle I to Cycle II. During the ongoing learning activities, colleagues acted as observers, observing student learning activities using student observation sheets previously prepared by the researcher. Data from observations of student engagement during Cycles I and II can be seen in Figure 2 below:

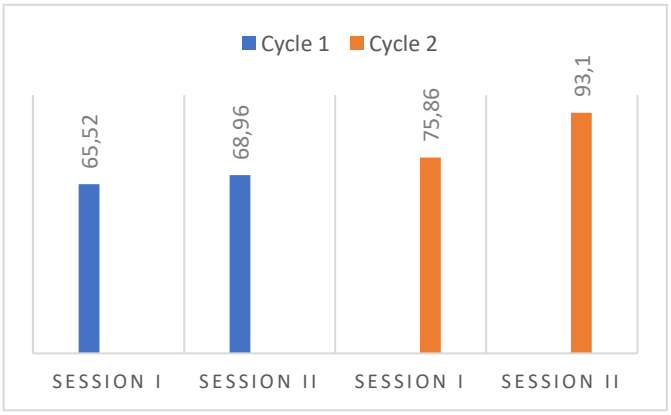

Figure 2. Recapitulation of student observation results from cycle I and cycle II

Based on Figure 2, there is an increase in observation results from Cycle I meetings 1 and 2, and Cycle II meetings 1 and 2. In the "excellent" category, in cycle I meeting 1, with a percentage of 65.52% is in the sufficient category, but increased slightly in the second meeting with a rate of 68.96% in the adequate category, in cycle II meeting I, with a percentage of 75.86% in the good category. There was an increase in the number of meetings by 93.10%. There is a significant increase in the "excellent" category, which means a decrease from cycle I to cycle II by 17.24%. From these data, it can be concluded that there is quite substantial progress, especially in the "good" and "excellent" categories, which, combined, experience a total increase of 17.24% from cycle I to cycle II. Based on the evaluation value of numeracy ability obtained through the final numeracy ability sheet in cycle II, it was recorded that as many as 27 students met the Success criterion of achieving numeracy ability

with an achievement value of 75. This achievement reflects a real increase in students' numeracy ability from cycle I to cycle II. To provide a clearer picture of the development from cycle I to cycle II, the following is an illustration of data comparing the increase from cycle I to cycle II, which can be seen in Figure 3 below:

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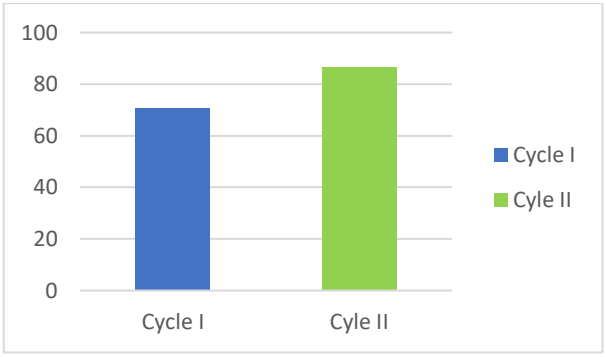

Figure 3. Comparison between cycles I and II

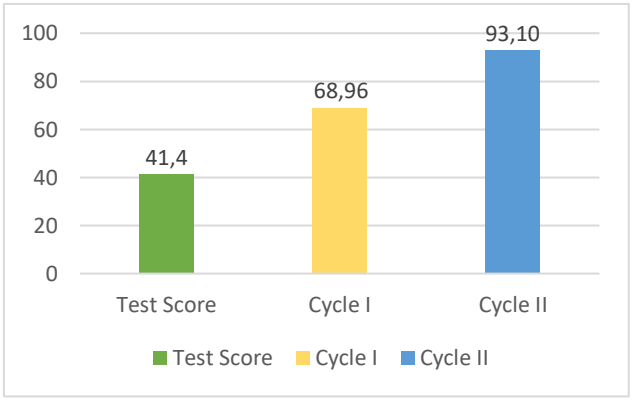

Figure 4. Classical comparison of initial observations and student test results in cycles I and II

The value of the student's numeracy ability sheet. Figure 3 shows an increase from cycle I to cycle II, with the percentage developing according to expectations. Moreover, developed very well in cycle I, reaching 70.69%, increasing in cycle II to 86.64% with 29 students, representing a 15.95% increase. Furthermore, the percentage began to increase in cycle I, reaching 34.48%, decreasing in cycle II to 10.34%, resulting in a 22.41% decrease. Researchers have improved the learning outcomes of Grade IV students in Cycle II, achieving the 75% success indicator. Therefore, researchers feel they have achieved the predetermined target and do not need to continue to the next cycle, stopping at cycle II.

Based on the evaluation results obtained through the final test in cycle II, it was noted that 18 students successfully met the Learning Objectives Achievement Criteria (KKTP) with a standard score of 75. This achievement reflects a significant improvement in students' numeracy learning ability compared to the Math-Action: Master of Action Research in Mathematics Classroom conditions during the initial observation. To provide a clearer picture of this development, the following is an illustration of data comparing the results of initial observations with the test results in cycle II, which can be seen in Figure 4.

Classical comparison of initial observation and students' numeracy test scores in cycles I and II. Based on Figure 4, there is an increase from the initial observation to cycle II. In the initial observation, the completion percentage was 41.4% and increased in cycle II to 93.10% with 29 students, increasing by 51.7%. Furthermore, the percentage of incompleteness in the initial

observation was 58.6%, decreasing in cycle II by 6.89%, resulting in a decrease of 51.71%. Researchers have improved the learning outcomes of Grade IV students in Cycle II so that the success indicator of 75% was achieved. Therefore, researchers feel they have achieved the predetermined target and do not need to continue to the next cycle, stopping at cycle II.

3.2 Discussion

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This classroom action research was conducted in two cycles, each with two learning sessions. During the learning process, the PjBL model was applied to improve the learning process and students' numeracy skills. Data was collected using several instruments, including teacher activity observation sheets, student learning activity observation sheets, and student numeracy ability test sheets used during project work and numeracy ability tests given at the end of each cycle to measure students' competency achievement. Based on the results of research conducted over two cycles, applying the PjBL learning model has been proven to provide significant improvement in the student learning process. Student activity showed an apparent increase, from 65.52% - 68.96% at meetings 1 and 2 of cycle I, increasing to 75.86% - 93.10% at meetings 1 and 2 of cycle II, increasing by 17.24%. In addition, the students' numeracy learning test results also experienced significant progress, where in cycle I, only 70.69% of students achieved completeness, and increased to 86.64% in cycle II, or an increase of 15.95%. The student's numeracy test also experienced significant progress, where in the initial observation, only 41.4% of students achieved completeness, and increased to 93.10% in cycle II, or an increase of 51.71%. Improvements in the learning process are also evident in previous research, such as that conducted by (Wijayanti et al., 2024), where student learning activity increased from 65% in cycle I to 74.2% in cycle II, a 9.2% increase. A similar finding was found in Yunika's research (Indarwati, Y., & Ambarwati, R, 2023) which showed an increase in student engagement from 57% in cycle I to 100% in cycle II, a 43% increase. These findings reinforce that active and engaging learning can significantly enhance participation and the learning process.

The improvement in numeracy learning occurred because the PjBL model matched the material being taught. In this model, students were directly involved in the numeracy learning process to produce a work/project. Students' enthusiasm for playing while learning to create a work using the PjBL model, with student engagement during the learning process increasing significantly from cycle I to cycle II, by 17.24%. in line with the indicators of numeracy ability according to (Deslegina & Hatiningsih, 2022), the process of learning numeracy is a series of stages that lead to changes in students' behavior towards their peers, encompassing three important aspects: knowledge (cognitive), attitude (affective), and skills (psychomotor). These positive changes indicate development towards improvements compared to previous conditions in thinking, behaving, and acting.

This is evident from the numeracy test, which increased by 15.95% from cycle I to cycle II, and the student test questions increased by 51.7% from the initial observation to cycle II. This is evident from the assessment of students when answering test questions, which indicates a significant increase in student knowledge. In line with the theory of student numeracy characteristics, according to (Astuti *et.al*, 2023)Numeracy is a form of student achievement in academics obtained through various means, such as taking exams, completing assignments, and actively participating in the learning process, including asking and answering questions. These activities are mutually supportive and play a crucial role in improving student understanding and learning outcomes. Numeracy is a measuring tool to determine the extent to which a student has understood and mastered the material presented by the teacher. Through numeracy skills, we can see the skills possessed by each child, the level of success of students in receiving, understanding real numbers, including addition, subtraction, and division, as well as understanding and applying the knowledge taught during the learning process. (Rahmi, 2020). The improvement in students' numeracy skills occurred thanks to implementing the PjBL learning model, which encourages students to be directly involved in the learning process. In addition, this progress is also seen in students' abilities in solving

problems and creating a work/project given by the teacher through numeracy ability sheets and question tests, which indicate that they understand the material better.

4 Conclusions

Based on the analysis results and discussion during the implementation of the research, it can be. It was concluded that the use of the PjBL learning model in learning activities for mathematical numeracy skills in class IV of MIS Assu'udiyah Bungo could positively impact the quality of the learning process and students' numeracy skills. This was reflected in the increase in teacher performance recorded through observation sheets, which increased by 2.94% from cycles I to II. In addition, active participation and student involvement in the learning process also experienced a significant increase, namely by 17.24% in the same period. Regarding academic achievement, the completeness of students' numeracy skills showed excellent development, with an increase of 15.95%. Then, in the students' numeracy test questions, they also showed encouraging development, where in cycle I the completeness reached 68.96% and increased to 93.10% in cycle II. These findings indicate that the PjBL model effectively creates an interactive learning atmosphere, encourages direct student involvement in the learning process, produces work, and improves the overall numeracy skills of mathematics learning.

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Appendix

Table A1. instrumen penilaian kemampuan berhitung

No	Nama siswa	Kriteria Pembelajaran																Kriteria Penilaian
		Mampu melalukan kemampuan berhitung				Memiliki ketelitian dan konsentrasi dalam mengerjakan proyek				Memiliki pemahaman konsepruang dan waktu dalam melaksanakan proyek				Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya				
		11	22	33	44	11	22	33	44	11	22	33	44	11	22	33	44	

Table A2. Rubrik penilaian Penilaian Observasi Guru Dalam Mengambil Nilai Kemampuan Berhitung Matematika.

No	Indikator	Skor	Poin presentase (%)	Deskripsi

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1	Mampu melalukan kemampuan berhitung	4	100%	Sangat Mampu
		3	75%	Cukup Mampu
		2	50%	Kurang Mampu
		1	25%	Tidak Mampu
2	Memiliki ketelitian dan konsentrasi dalam mengerjakan proyek	4	100%	Sangat teliti
		3	75%	Cukup teliti
		2	50%	Kurang teliti
		1	25%	Tidak teliti
3	Memiliki pemahaman konsep ruang dan waktu dalam melaksanakan proyek	4	100%	Sangat paham
		3	75%	Cukup paham
		2	50%	Kurang paham
		1	25%	Tidak paham
4	Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya	4	100%	Sangat Kreatif
		3	75%	Cukup kreatif
		2	50%	Kurang kreatif
		1	25%	Tidak kreatif

Table A3. Rubrik penilaian kemampuan berhitung

No	Indikator	Skor	Kriteria	Deskripsi
1	Mampu melalukan kemampuan berhitung	4	BSB	Anak mampu melakukan kemampuan berhitung yang ada di LKPD secara Sendirian tampan di bantu teman maupun guru.
		3	BSH	Anak mampu melakukan kemampuan berhitung yang ada di LKPD tampan di bantu teman.
		2	MB	Anak mampu melakukan kemampuan berhitung yang ada di LKPD dengan bimbingan guru/teman.
		1	BB	Anak belum mampu melakukan kemampuan berhitung yang ada di LKPD.
2	Memiliki ketelitian dan konsentrasi dalam mengerjakan proyek	4	BSB	Anak memiliki ketelitian dan konsentrasi dalam Mengerjakan project tampa memintak bantuan teman/guru.
		3	BSH	Anak memiliki ketelitian dan konsentrasi dalam Mengerjakan project dengan memintak bantuan guru.
		2	MB	Anak memiliki ketelitian dan konsentrasi dalam Mengerjakan project dengan bantuan teman.
		1	BB	Anak tidak memiliki ketelitian dan konsentrasi dalam Mengerjakan project.
3	Memiliki pemahaman konsep ruang dan waktu dalam melaksanakan proyek	4	BSB	Anak Memiliki pemahaman konsep ruang dan waktu dalam melaksanakan proyek tanpa di ingati oleh guru/teman.
		3	BSH	Anak Memiliki pemahaman konsep ruang dan waktu dalam melaksanakan proyek dan di ingati oleh guru.
		2	MB	Anak Memiliki pemahaman konsep ruang dan waktu dalam melaksanakan proyek dan di ingati oleh teman.
		1	BB	Anak Tidak Memiliki pemahaman konsep ruang dan waktu dalam melaksanakan proyek.
4	Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya	4	BSB	Anak Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya tanpa bantuan guru/teman
		3	BSH	Anak Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya dengan bantuan teman.
		2	MB	Anak Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya dengan bantuan guru.
		1	BB	Anak tidak Memiliki kreatifitas dan imajinasi untuk menciptakan suatu karya.

Table A4. Data Hasil penilian kemampuan berhitung matematika

No	Nama	Skor	Presentase	Kriteria Penilaian
1				
Jumlah				
Rata - Rata				

Keterangan kriteria :

1. Kriteria belum berkembang (BB) antara 0-50%
2. Kriteria mulai berkembang (MB) antara 51-74%
3. Kriteria Berkembang Sesuai Harapan (BSH) antara 75-90%
4. Kriteria berkembang sangat baik (BSB) antara 91-100%