

## **The Effectiveness of Blended Learning Model towards Learning Outcomes of Students' Multiplication Operations with Autism**

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**Abstract:** This study aims to test the effectiveness of the blended learning model on the learning outcomes of multiplication operations of students with autism in class VII SMPLB at the Pembina State Special School of East Kalimantan Province. This study uses a quantitative approach with the type of Single Subject Research (SSR). The research design uses A-B-A'. The research subjects were three students with autism class VII SMPLB. Data collection techniques using tests and observations. Data is presented in tables and graphs. The data analysis technique uses analysis under conditions and between conditions. The results showed an increase in the acquisition of test scores. The first subject got 40% at baseline 1 to 70% at baseline 2. The second subject got 30% at baseline 1 to 50% at baseline 2. The third subject got 30% at baseline 1 to 60% at baseline 2. Based on these findings, it can be concluded that the blended learning model is effective on learning outcomes of multiplication operations of students with autism. This conclusion is based on increasing scores of all three subjects and is supported by a low percentage of overlap.

**Keywords:** Blended Learning Model, learning outcomes of multiplication operations, students with autism.

### **INTRODUCTION**

Teaching and learning activities in the world of education in general before the COVID-19 pandemic took place with teachers and students meet each other directly with a model called face-to-face. This is an ideal model that has many advantages according to Nengrum, Solong, and Iman (2021: 6) namely the interaction of teachers with students can run effectively so that they become more enthusiastic in participating in the ongoing learning and providing comprehensive material.

This face-to-face model is also applied to students with special needs, one of which is students with autism. The reason for using the face-to-face model for students with special needs is based on the cone of experience learning theory proposed by Dale (1969 in Nabiulana, 2019: 25) namely that students in general will know more about learning materials that can be simulated rather than listening explanation from the teacher.

This face-to-face model was used until the COVID-19 pandemic that have caused the face-to-face model to be replaced with an online learning model based on the Joint Decree of the Minister of Education, Culture, Research and Technology, Minister of Religion, Minister of Health, and Minister of Home Affairs Number 05/KB/2021, 1347, HK.01.08/MENKES/6678/2021, 443-5847 2021 about the Guidelines for the Implementation of Learning during the Pandemic Coronavirus Disease 2019 (COVID-19) to reduce the spread of the COVID-19 virus.

The online learning model is a less effective model for students with autism. This is indicated by the decrease in learning outcomes of multiplication operations by students with autism. Theoretically based on the theory of Dale (1969, in Nabiulana, 2019: 25), the right learning for students with autism is to use a learning model that can be simulated and observed

directly compared to being listened by the teacher. The online learning model is less able to simulate and observe teaching and learning activities directly in accordance with the ideal conditions of the theory above.

The results of previous research from Krisnawati & Putri (2022: 1331) also revealed the weaknesses of the online learning model for students with autism including the difficulty of the teacher in delivering material so that the students could understand, difficulties in communicating online and the busyness of parents to accompany the students with autism during online learning.

The problem regarding online learning was then further investigated by the researchers by examining facts in the field with the research site at the State Special School of Pembina East Kalimantan. The facts in the field are based on the results of observations and interviews in the field during the educational practice period. Observations were carried out in class VII SMPLB Autism with online and visiting schools outside the online system during the Educational Practice activities from July 14 to December 12 2021. The targets of observation were focused on students, parents and teachers who teach in the class. The observations made were focused on online learning carried out by schools. During the observation, the teacher used the whatsapp video call and google meet platforms depending on the situation and the students' needs. First, the teacher explains the material to the students, then the students were asked to do the exercises given by the teacher. The results of observations showed that students rarely answered or responded to questions from the teacher, then when the teacher asked students to do the exercises they looked confused and had to be guided by the teacher. When the teacher corrects the student's work, the student does not focus on their attention when responding to a signal from the teacher. The teacher finally continued to correct the students' multiplication results even though the students rarely paid attention. Therefore, during the online learning's activities, there appears to be a lack of participation from students paying attention to the materials that were presented by the teacher.

Interviews were conducted online and at schools (offline) from 14 to 16 July 2021 with school principals and seventh grade autism teachers from the Pembina State Junior High School in East Kalimantan Province with interview topics covering the implementation of online learning that being conducted by schools. The results of interviews on the topic of online learning shows that students with autism often have signal disturbances and spend quota assistance from the Ministry of Education and Culture during online learning excessively. Especially in learning multiplication operations, the teacher uses google meet during learning and whatsapp video calls for individual communication through the media if one of the students does not understand the learning material that were being taught. The teacher also received complaints from the boredom of students with autism participating in online learning so that it was difficult in terms of class management. The teacher then argues that conditions like this caused students' learning outcomes to decline.

The results of observations and interviews that are supported by theory and the results of previous studies show that the online learning model used at the Pembina State Special School of East Kalimantan Province is less effective, thus reducing the learning outcomes of multiplication operations for students with autism. However, due to the COVID-19 pandemic, it is not possible to return using the face-to-face learning model. Therefore, it is necessary to apply the latest alternative learning model solutions apart from face-to-face and online models that can overcome these problems. One of them is by using blended learning.

Hrastinski (2019: 566) explains that Blended Learning is a concept used to describe learning that combines conventional models with face to face or face to face with online learning. The advantages that can be found from the blended learning model according to Fathurrahman & Nuthapaturahman (2015: 5) are time-saving, cost-effective, learning is more effective and efficient, students are easy to access learning materials, students can study

subject matter independently, utilize learning materials available online, students can have discussions with teachers outside of the face-to-face learning hours, teachers don't spend too much energy teaching, add enrichment material through internet facilities, expand the range of learning/training, optimal results and increase the attractiveness of learning .

This learning solution with blended learning had hopes to be achieved, namely as an alternative model of the online model to improve learning outcomes of multiplication operations for students with autism, especially after seeing the concept of blended learning and its advantages.

The reason for using the blended learning model compared to other learning models is that there are restrictions on face-to-face learning models as instructed by the Ministry of Education and Culture in a Joint Decree of the Minister of Education and Culture, Minister of Religion, Minister of Health, and Minister of Home Affairs of the Republic of Indonesia. Number 05/KB 2021, Number 1347 of 2021, Number HK.01.08/Menkes/6678/2021, Number 443-5847 of 2021 concerning Guidelines for the Implementation of Learning During the Pandemic Coronavirus Disease 2019 (COVID-19) to reduce the spread of the COVID-19 virus so that full face-to-face cannot be carried out and based on the results of previous observations which suggest the ineffectiveness of online learning.

## **METHOD**

This study uses a quantitative approach. Quantitative research according to Sukmadinata (2017: 53) is research based on the philosophy of positivism which is centered on objective phenomena and analyzed quantitatively. This quantitative research uses the type of Single Subject Research (SSR) which according to Prahmana (2021: 9) is an experimental study conducted on a single subject to observe and assess a particular intervention on changes that occur in the subject with repeated observations on a single subject for a certain time. The final result to be achieved with this type of research is to reveal the results of testing the effectiveness of the implementation of the blended learning model that will be carried out on the learning outcomes of integer multiplication operations for students with autism. During this research, the condition of the research subjects will be observed before being given treatment (baseline condition 1), then at the time of being given treatment (intervention condition), and after being given treatment (baseline condition 2).

The place where this research was carried out was at the Pembina State Special School of East Kalimantan Province. The basic considerations of the researchers in choosing a research location at that location are: a) There is no blended learning model in multiplication operations learning for students with autism at school and b) Have the capacity to carry out blended learning models with students with autism in learning multiplication operations. students with autism .

This research was carried out within 4 weeks while the learning took place in April of the 2022/2023 academic year. This is because researchers need to observe and test the development of learning outcomes in the early and final phases. The research subjects were three individual students with autism class VII at the Pembina State Special School, East Kalimantan Province.

The research design used in this study was A-B-A'. According to Prahmana (2021: 15), the A-B-A' design is a research development design in SSR from a simple AB design where there is a return to the baseline condition after the intervention session was carried out. A is another term for Baseline 1 session and B is another term for intervention session and A' is another term for Baseline 2.

The implementation of Baseline 1 in this study was in the form of conducting observations and pretests on the results of learning mathematics with integer multiplication operations before the intervention was implemented in 3 sessions. The intervention phase was

held for 6 sessions in the blended learning model where three times to be taught using the online learning model and three times to be taught using the face-to-face model. The implementation of Baseline 2 is a repetition of baseline 1 where the researcher will observe and give a final test without intervention three times to evaluate the effectiveness of the blended learning learning model on the learning outcomes of students with autism multiplication operations.

Data collection techniques used in this study were observation and tests. The test according to Sukmadinata (2017: 223) is a technique of collecting data by measuring the achievement of both mathematics and non-mathematical students. The test used is a short answer test. The purpose of this type of test according to Gronlund (1985 in Faradillah, Hadi & Soro, 2020: 20) is to test low thinking skills, namely: 1) understanding of terms, 2) understanding of facts, 3) understanding of principles, 4) understanding of procedures, and 5) interpreting data simply. Multiplication operation which is measured based on the time range. The time span in question is before the intervention (baseline 1), at the time of the intervention (intervention) and after the intervention (baseline 2) to find out the final learning outcomes of students after undergoing learning with the blended learning model during the time of the study.

Sugiyono (2017: 203) explains that observation is a data collection technique with specific characteristics, namely observing directly the conditions in the field which are not limited to individuals, but also other natural objects. Observations made in this study are participatory so that researchers are directly involved in manipulating the behavior of students when observed.

Moelong (2017: 280-281) explains that data analysis techniques are techniques for organizing and sorting data into a category so that hypotheses can be formulated according to the data results. The analysis that were used in this study are under conditions and between conditions. The steps in conducting analysis under conditions and between conditions according to Prahmana (2021: 32-39). The analysis technique under conditions and between conditions were data analysis technique used in this study. Under conditions analysis will cover several aspects including: 1) Condition length, 2) directional trend, 3) stability trend, 4) trail trend, 5) stability level or range, and 6) level change. The analysis between conditions will discuss aspects including: 1) the number of variables that are changed, 2) changes in the direction of the trend, 3) changes in the stability trend, 4) changes in level, and 5) the percentage of overlap.

## **RESULT AND DISCUSSION**

### **Result(s)**

The results obtained from the acquisition of scores are then converted as speed levels expressed in the form of a percentage which will then be tested for hypotheses to determine the effectiveness of the blended learning model for students with autism.

The first subject in the baseline phase 1 of session 1 obtained a presentation score of 40%. Then, at the end of baseline session 1 session 3 obtained a percentage score of 40% with an average score acquisition of 40% thus being included in the low category. The second subject in the baseline phase 1 of session 1 obtained a presentation score of 30%. Then, at the end of baseline session 1 session 3 obtained a percentage score of 30% with an average score acquisition of 30% thus being included in the low category. The third subject in the baseline phase 1 of session 1 obtained a presentation score of 30%. Then, at the end of baseline session 1 session 3 obtained a percentage score of 30% with an average score acquisition of 30% overall thus being included in the low category.

**Table 1. Scores of the Three Subjects in the Baseline Phase 1**

Phase	sessions	First Subject Score	Second Subject Score	Third Subject Score
Baseline 1	1	4 (40%)	3 (30%)	3 (30%)
Baseline 1	2	4 (40%)	3 (30%)	3 (30%)
Baseline 1	3	4 (40%)	3 (30%)	3 (30%)
Average		4 (40%)	3 (30%)	3 (30%)

The first subject in the intervention phase of session 1 obtained a percentage score of 60%. Then, at the end of the intervention session, the subject obtained a percentage score of 60% with an average score of 60% so that it was included in the sufficient category. The second subject in the intervention phase of session 1 obtained a percentage score of 40%. Then, at the end of the intervention session, the subject obtained a percentage score of 40% with an average score of 40% so that it was included in the low category. The third subject in the intervention phase of session 1 obtained a percentage score of 50%. Then, at the end of the intervention session, the third subject obtained a percentage score of 50% with an average score of 50% so that it was included in the sufficient category.

**Table 2. Scores of the Three Subjects in the Intervention Phase**

Phase	Sessions	First Subject Score	Second Subject Score	Third Subject Score
Intervention	1	6 (60%)	4 (40%)	5 (50%)
Intervention	2	5 (50%)	3 (50%)	4 (40%)
Intervention	3	6 (60%)	4 (40%)	5 (50%)
Intervention	4	6 (60%)	4 (40%)	5 (50%)
Intervention	5	6 (60%)	4 (40%)	5 (50%)
Intervention	6	6 (60%)	4 (40%)	5 (50%)
Average		5,833 (58.3%)	3,833 (38.3%)	4,833 (48.3%)

The first subject in the baseline phase 2 session 1 obtained a percentage score of 80%. Then, at the end of the baseline session 2, the first subject obtained a percentage score of 80% with an average score of 80% so that it was included in the good category. The second subject in the baseline phase 2 session 1 obtained a percentage score of 50%. Then, at the end of the baseline session 2, the second subject obtained a percentage score of 50% with an average score of 50% so that it was included in the sufficient category. The third subject in the baseline phase 2 session 1 obtained a percentage score of 70%. Then, at the end of the baseline session 2, the third subject obtained a percentage score of 70% with an average score of 70% so that it was included in the good category.

**Table 3. Scores of the Three Subjects in the Baseline Phase 2**

Phase	Sessions	First Subject Score	Second Subject Score	Third Subject Score
Baseline 2	1	8 (80%)	5 (50%)	7 (70%)
Baseline 2	2	8 (80%)	5 (50%)	7 (70%)
Baseline 2	3	8 (80%)	5 (50%)	7 (70%)
Average		8 (80%)	5 (50%)	7 (70%)

The results of the accumulated test scores on these three subjects were then converted into a polygon graph.

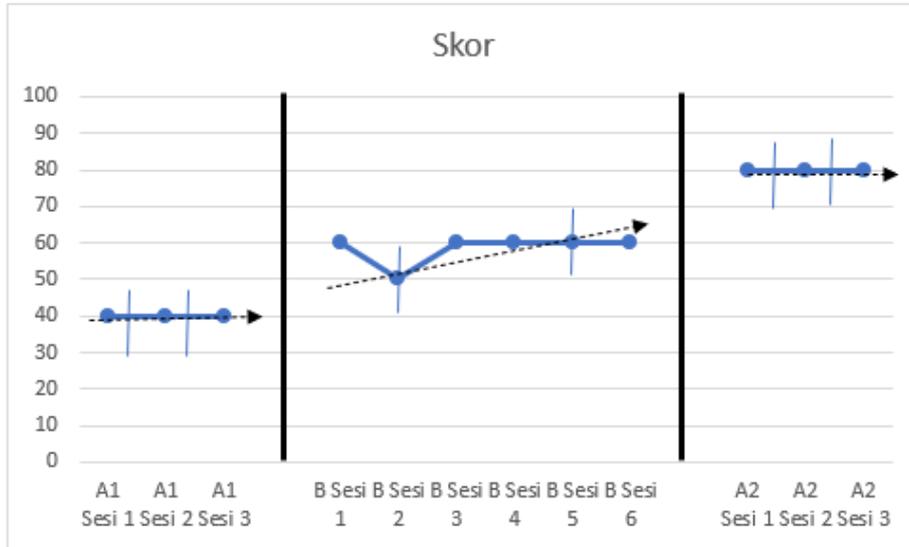


Figure 1. Graph of the Accumulated Score of First Subjects

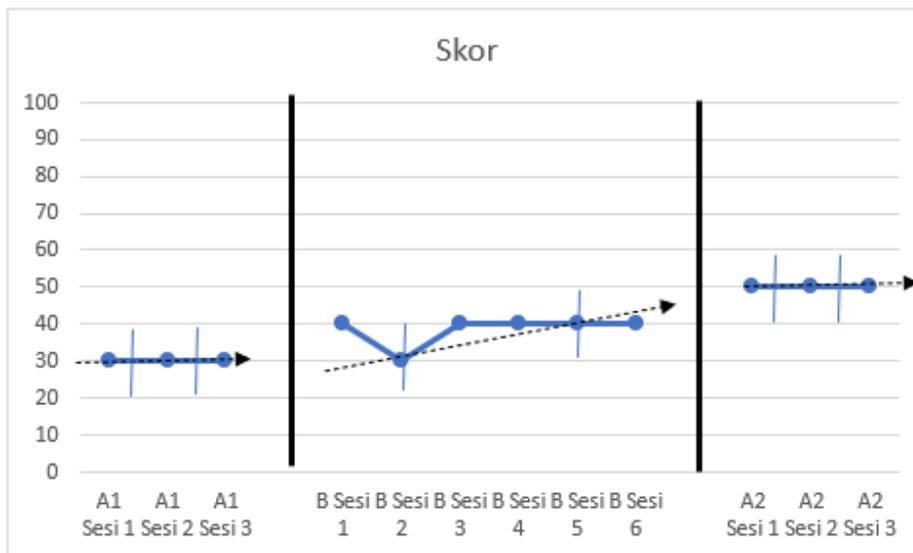


Figure 2. Graph of Accumulated Scores for Second Subjects

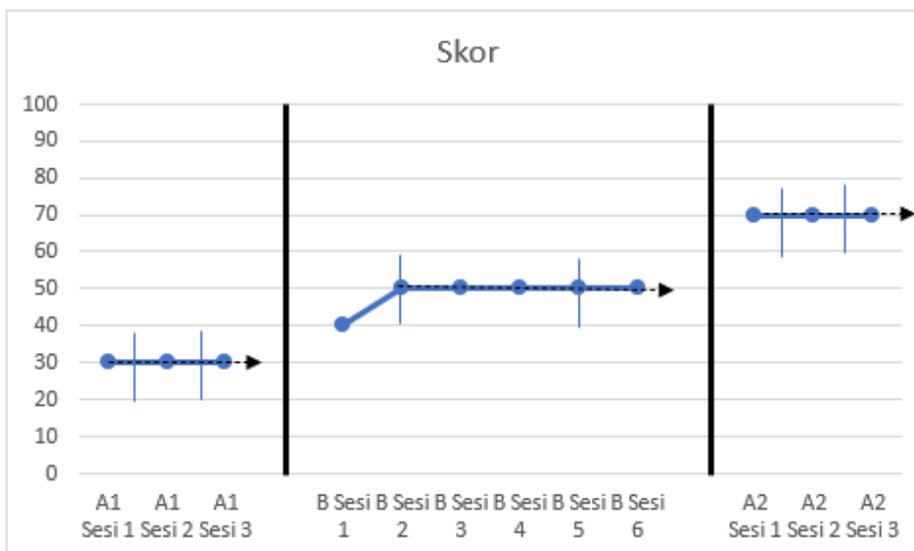


Figure 3. Graph of the Accumulated Score of the Third Subject

The overall test results showed that there was an increase in the percentage score for the three subjects. The percentage score for the first subject in the baseline phase 1 is 40%, and then increased to 80% in the baseline phase 2. Meanwhile, the percentage score for the second subject in the baseline phase 1 is 30%, and then increased to 50% in the baseline phase 2. Finally, the score percentage of the third subject in the baseline phase 1 which is 30%, and then increased to 70% in the baseline phase 2.

The results of observations on the behavior of the three research subjects during the study showed that there was a significant increase in the accumulation of observation scores for each subject. The test results obtained from these three subjects were then analyzed to test the hypothesis by using under conditions analysis and between conditions analysis.

**Table 4. Accumulated Observation Scores of the three Subjects in the Baseline 1, Intervention, and Baseline 2 Phases**

Phase	Sessions	First Subject's Observation Score	Second subject's observation score	The third subject's observation score
Baseline 1	1	5	5	5
Baseline 1	2	6	5	6
Baseline 1	3	6	6	7
Intervention	1	8	7	7
Intervention	2	6	5	10
Intervention	3	10	8	11
Intervention	4	12	8	11
Intervention	5	14	11	12
Intervention	6	14	12	13
Baseline 2	1	13	11	12
Baseline 2	2	14	12	13
Baseline 2	3	14	14	14

The results of the analysis calculation in the condition of the first subject in the aspect of stability level showed stable (83.33% in the intervention phase & 100% in the baseline phase 1 and 2) in the three phases. Changes in baseline level 1 are 40-40 (0), then the intervention phase is 50-60 (+10), then baseline phase 2 is 80-80 (0).

**Table 5. Analysis Results in the First Subject Condition**

No.	Condition or Phase	A1	B	A2
1.	Condition Length	3	6	3
2.	Directional Tendency			
3.	Stability tendency	100% (Stable)	83.33% (Stable)	100% (Stable)
4.	Trace Tendency			
		(=)	(+)	(=)
5.	Stability Level and Range	<u>Stable</u> 40-40	<u>Stable</u> 60-50	<u>Stable</u> 80-80
6.	Level Change	<u>40-40</u> (0)	<u>60-50</u> (+10)	<u>80-80</u> (0)

The results of the analysis calculation in the condition of the second subject in the aspect of stability level showed stable (83.33% in the intervention phase & 100% in the baseline phase 1 and 2) in the three phases. Changes in baseline level 1 are 30-30 (0), then the intervention phase is 30-40 (+10), then baseline phase 2 is 50-50 (0).

**Table 6. Analysis Results in the Second Subject Condition**

No.	Condition or Phase	A1	B	A2
1.	Condition Length	3	6	3
2.	Directional Tendency	<u>          </u>	<u>          </u>	<u>          </u>
3.	Stability tendency	100% (Stable)	83.33% (Stable)	100% (Stable)
4.	Trace Tendency	<u>          </u>	<u>          </u>	<u>          </u>
		(=)	(+)	(=)
5.	Stability Level and Range	<u>Stable</u>	<u>Stable</u>	<u>Stable</u>
		30-30	30-40	50-50
6.	Level Change	<u>30-30</u>	<u>40-30</u>	<u>50-50</u>
		<u>(0)</u>	<u>(+10)</u>	<u>(0)</u>

The results of the analysis calculation in the condition of the third subject in the aspect of stability level showed stable (83.33% in the intervention phase & 100% in the baseline phase 1 and 2) in the three phases. Changes in the baseline level 1 are 30-30 (0), then the intervention phase is 40-50 (+10), then the baseline phase 2 is 70-70 (0).

**Table 7. Analysis Results in the Third Subject Condition**

No.	Condition or Phase	A1	B	A2
1.	Condition Length	3	6	3
2.	Directional Tendency	<u>          </u>	<u>          </u>	<u>          </u>
3.	Stability tendency	100% (Stable)	83.33% (Stable)	100% (Stable)
4.	Trace Tendency	<u>          </u>	<u>          </u>	<u>          </u>
		(=)	(=)	(=)
5.	Stability Level and Range	<u>Stable</u>	<u>Stable</u>	<u>Stable</u>
		30-30	40-50	70-70
6.	Level Change	<u>30-30</u>	<u>50-40</u>	<u>70-70</u>
		<u>(0)</u>	<u>(+10)</u>	<u>(0)</u>

The results of the analysis between conditions in the first subject showed that the change in stability from the baseline 1 to the intervention phase and the intervention phase to the baseline 2 was stable to stable. The percentage of overlap from the baseline phase 1 to the intervention and the intervention phase to the baseline 2 was 0%.

**Table 8. Results of the Analysis of the First Subject Conditions**

No.	Condition Comparison	Results (A1-B)	Results (B-A2)
1.	Number of variables changed	1, namely the results of learning multiplication operations for students with autism	1, namely the results of learning multiplication operations for students with autism
2.	Changes in trend direction and their effects	<u>          </u> <u>          </u>	<u>          </u> <u>          </u>
	Stability trend change	(=) (+) Stable to Stable	(+) (=) Stable to Stable
3.	Level Change	(40-60) +20	(60-80) +20
4.	Overlap Percentage	0%	0%

The results of the analysis between conditions in the second subject showed that the change in stability from the baseline 1 to the intervention phase and the intervention phase to the baseline 2 was stable to stable. the percentage of overlap from the baseline phase 1 to the intervention was 0%. While the percentage of overlap from the intervention phase to the baseline phase 2 is 16.67%.

**Table 9. Results of Analysis Between Third Subject Conditions**

No.	Condition Comparison	Results (A1-B)	Results (B-A2)
1.	Number of variables changed	1, namely the results of learning multiplication operations for students with autism	1, namely the results of learning multiplication operations for students with autism
2.	Changes in trend direction and their effects	 (=) (+)	 (+) (=)
3.	Stability trend change	Stable to Stable	Stable to Stable
4.	Level Change	(30-40) +10	(50-60) +10
5.	Overlap Percentage	16.67%	0%

The results of the analysis between conditions in the third subject showed that the change in stability from the baseline 1 to the intervention phase and the intervention phase to the baseline 2 was stable to stable. the percentage of overlap from the baseline 1 to the intervention phase and the intervention phase to the baseline 2 was 0%.

**Table 10. Results of the Analysis in the Third Subject Conditions**

No.	Condition Comparison	Results (A1-B)	Results (B-A2)
1.	Number of variables changed	1, namely the results of learning multiplication operations for students with autism	1, namely the results of learning multiplication operations for students with autism
2.	Changes in trend direction and their effects	 (=) (=)	 (=) (=)
3.	Stability trend change	Stable to Stable	Stable to Stable
4.	Level Change	(30-40) +10	(50-70) +20
5.	Overlap Percentage	0%	0%

The explanation that can be described based on the analysis within and between conditions is that there is an increase in the score and level of achievement of the multiplication operation learning outcome test in the baseline 2 phase against the baseline 1 phase for each subject. This explanation is also supported by the percentage of overlap where in the baseline 1 condition to the intervention, 0% for the first subject, 16.67% for the second subject, and 0% for the third subject. Meanwhile, the percentage of overlap in the intervention condition to baseline 2 was 0% for the first subjects, 0% for the second subjects, and 0% for third subjects. Based on the theory of data analysis of Single Subject Research according to Prahmana (2021: 39) where the smaller the percentage of overlap, the better the effectiveness of the intervention on target behavior, it can be concluded from the results of data analysis from the three research subjects that the blended learning learning model is effective on operating learning outcomes. Multiplication of students with autism.

## **Discussion(s)**

The research titled "The Effectiveness of the Blended Learning Model on Learning Outcomes of Multiplication Operations for Students with Autism" had the aim of testing the effectiveness of the blended learning learning model on the learning outcomes of multiplication operations of students with autism. Based on the results of hypothesis testing on research conducted on 3 students at the Pembina State Special School in East Kalimantan Province, it was found that the use of the blended learning model was effective on the students' learning outcomes of multiplication operations.

The three autistic students who are currently in class VII of the Autistic Junior High School previously had obstacles in improving the learning outcomes of multiplication operations material during the online learning model. This is then resolved with a blended learning model that allows face-to-face meetings so that students can directly observe concrete learning. This finding is supported by the theory of cone of experience, according to Dale (in Nabiulana, 2019: 25) explaining that students in general will know more about material that can be simulated than what is heard by the teacher's explanation. This also applies to students with autism where students know better if the material being taught can be simulated in a palpable and visualized context so that learning must be concrete or at least semi-concrete. This kind of learning certainly cannot be applied when using the model in the network.

The urgency behind the importance of this learning material is that the subject's learning outcomes are decreasing with the online learning model, so it is necessary to implement a more effective alternative learning model. As for other urgency, where arithmetic operations are always implemented in daily life, such as when shopping and managing finances. Based on these thoughts, it can be concluded that mastery of arithmetic operations is very important for every individual with autism. The focus of this research is focused on improving learning outcomes of multiplication operations of students with autism.

This research is an effort to innovate learning models to improve learning outcomes of multiplication operations for students with autism using a blended learning model. The implementation of Blended learning model conducted by researchers was successfully implemented because the learning was still carried out by holding face-to-face meetings even though it was interspersed with online learning. Then, when learning takes place, students tend to be able to follow the directions of the researcher independently so as to create practical collaboration between the subject and the researcher. Researchers also use learning resources that can be accessed by students outside the network by meeting directly with researchers and online using soft files uploaded by researchers. The researcher also assessed the test results and observed the three students in two different conditions, namely in the network using the google meet platform and outside the network face-to-face. The successful implementation of blended learning is in accordance with the theory from Carman (2005 in Nasution, Jalinus, Syahril, 2019: 37-39) explaining that there are five key designs so that blended learning can be carried out effectively, namely: 1) Live events, 2) self-paced learning, 3) collaboration, 4) assessment, and 5) performance support materials .

The increase in scores that occurred gradually in the intervention phase which were carried out for 6 meeting sessions for approximately 2 weeks for students with autism proved the effectiveness of the blended learning learning model to improve learning outcomes of multiplication operations of students with autism. This is supported by the theory from Abdullah (2018: 859) explaining that blended learning is a learning model that combines face-to-face learning models and learning models using computer technology that are carried out both within the network and outside the network at different times. Having the opportunity to meet face-to-face while still learning online due to the COVID-19 pandemic shows the advantages of the blended learning model in providing learning opportunities with more intensive social interaction than the online model.

The results of the study also revealed that the increase in scores between the three research subjects was different from each other. The percentage score of achievement at the end of baseline 2 from each subject was 80% in the first subject, 50% in the second subject, and 70% in the third subject. As for the background of the difference in the achievement of these scores, namely the difficulties faced by each research subject in the multiplication operation between two digits being taught. The first subject had difficulty in placing the numbers in units, tens, and hundreds as well as in multiplication between two digits using borrowing techniques. The third subject had more difficulties than the first subject, namely apart from the difficulties already mentioned in the first subject, the third subject also had difficulties in multiplying with pairs of numbers correctly. The second subject had more difficulties than the first and third subjects, namely apart from the difficulties mentioned in the first and third subjects, the second subject also experienced difficulties in adapting to using the arithmetic abacus so that sometimes it was still wrong to produce multiplication correctly even though the way of working was already done. appropriate. The unique and different difficulties between the three subjects of students with autism in learning multiplication operations are not uncommon. Utari, Kurniawan & Fathurrochman (2020: 75) explained that each individual with autism has different levels of disorders and barriers. This difference in barriers occurs due to age, intelligence level, the effect of treatment and therapy on each individual as well as several other habits. These differences in barriers then affect several areas of children's lives, including differences in learning outcomes of multiplication operations between students with autism at school.

Learning that is applied to students pays attention to the structure, scheduled, and programmed patterns. This scheduled pattern is to carry out learning every school day from Monday to Friday by adjusting the concept of blended learning, namely three times face-to-face and three times online. The material for the two-digit multiplication operation that is taught starts from the easy one, namely the two-digit multiplication operation in descending order without the technique of storing, then proceeds to the difficult stage, namely the technique of storing. The implementation of the learning in this research has been planned as outlined in the Lesson Plan (RPP) so that the objectives to be achieved are to improve learning outcomes of multiplication operations for students with autism. The aforementioned aspects are implemented in the context of this blended learning learning and the results strongly support the increase in the test scores obtained by the three subjects above. The above aspects of course follow and adapt to the theory of Hermansyah & Purnomo (2016: 13-15) namely the success of learning students with autism when using patterned, structured, and programmed principles.

The Blended Learning model that is applied to students with autism based on the results of ongoing research shows differences with blended learning for regular students. Blended learning for regular students only needs to pay attention to five key aspects as stated by Carman (2005 in Nasution, Jalinus, Syahril, 2019: 37-39), namely: 1) Live events, 2) self-paced learning, 3) collaboration, 4) assessment, and 5) performance support materials. For blended learning with students with autism, apart from the five aspects mentioned above, it is also necessary to pay attention to the characteristics and needs of students with autism. In blended learning for students with autism, it is necessary to pay attention that the characteristics of students with autism will affect the success of blended learning. The characteristics of students with autism based on the DSM V book written by the American Psychiatric Association (2013: 236) are limited and repetitive social interaction, communication, and behavior. Social interaction and communication as well as limited and repetitive behavior in the context of blended learning focuses on how teachers adapt in interacting and communicating and increasing the motivation of students with autism to actively learn, adapt, and present learning materials and media in two different classes, namely

the outdoor class. network and classes within the network. In addition, aspects that need to be considered are the needs of students with autism. Sofyan and Yuwono (2014: 19) explain that the needs of students with autism can be found by conducting an assessment of these students. The conclusion of this opinion is that before carrying out learning with blended learning for students with autism, an assessment should be carried out to find the learning needs of students for the smooth learning.

Another finding from this blended learning model is that during learning with this model, it will show less effectiveness if it is not supported by adequate learning media in overcoming parts that are difficult for students with autism to understand. This is in accordance with the conclusion of the research by Nurmantara, Indrawati, & Suganda (2020: 129) that the consideration of choosing the right media and learning model adapted to the material and characteristics of students will help each other so that the implementation of learning for students is better.

The factors that support the success of the intervention in this study are: 1) The first factor, namely the blended learning model, can provide opportunities for the three research subjects to learn face-to-face so as to create intensive and fun social interactions. 2) The second factor, namely the three research subjects had the motivation to increase the short answer test scores through exploration of different ways and results of answers in each meeting. 3) The third factor, namely the research subject can adapt to the varied learning environment of blended learning. 4) The fourth factor, namely cooperation or cooperation from the school, especially from homeroom teachers who teach and parents in creating a conducive learning environment. The supporting factors as described above are in accordance with the theory of Ramadani, Sulthoni & Wedi (2018: 205) where the success factors for implementing the blended learning model, apart from educational guidelines, are human resources both from teachers and students. and an adequate learning environment.

The effectiveness of the blended learning learning model on the multiplication operation learning outcomes of students with autism is evidenced by the increase in the short answer test scores from the baseline 1 session to the intervention and to the baseline 2 session and the low percentage of data overlap. Based on the theory of Prahmana (2021: 39) explains that the smaller the percentage of overlap, the better the influence of the intervention on target behavior. There is other evidence from the results of previous research by Hardiansyah (2017: 214) which found that the Blended Learning learning model implemented was more effective than conventional Arabic learning in improving learning outcomes in the listening ability of students with autism. Based on the results of hypothesis testing which is supported by expert opinion and from the results of previous studies, it can be concluded that the blended learning model has an effective influence in improving learning outcomes of multiplication operations of students with autism.

## **CONCLUSION**

### **Conclusion(s)**

The conclusion that can be drawn based on the results of the research that has been presented and discussed is that the blended learning model is effective on the learning outcomes of multiplication operations for students with autism. This is indicated by the increase in the scores of the three subjects after being given intervention in the baseline phase 2 when compared to the initial ability of the subjects in the baseline phase 1. The first subject in the baseline phase 1 got an average level of achievement of 40%. Then in the intervention phase the average level of achievement rose to 58.33% and at baseline 2 it rose again to 80%. The second subject in the baseline phase 1 got an average level of achievement of 30%. Then in the intervention phase the average level of achievement rose to 38.33% and at baseline 2 it rose again to 50%. The third subject in the baseline phase 1 got an average level of

achievement of 30%. Then in the intervention phase the average level of achievement rose to 48.33% and at baseline 2 it rose again to 70%. This finding is also supported by the overlapping percentage of the three subjects. The first subject score has data overlap between conditions at baseline 1 and intervention and intervention and baseline 2 by 0%. The second subject score has data overlap between conditions at baseline 1 and intervention by 16.67% and at intervention and baseline 2 by 0%. The third subject score has data overlap between conditions at baseline 1 and intervention and intervention and baseline 2 by 0%. The increase in scores in the baseline 1, intervention, and baseline 2 phases is supported by the low percentage of overlapping data between conditions in the three subjects, indicating that the blended learning model is effective in improving learning outcomes of multiplication operations students with autism.

### **Implication(s)**

The implications that can be conveyed based on the results of the research and the conclusions that have been made are as follows: 1) For students, the use of the blended learning model is effective in improving learning outcomes of multiplication operations. Therefore, it is necessary to develop a blended learning model in other areas of learning material. 2) For teachers, the blended learning model can be used as a model choice to improve the learning outcomes of students with autism in other subjects. 3) For the school, the blended learning model can be taken into account in the agreement of implementing the curriculum using alternative learning models other than the online model on the learning outcomes of students with autism in various fields of learning.

### **Suggestion(s)**

Researchers can provide suggestions based on research findings as follows: 1) Teachers are expected to understand and examine more deeply and implement the application of the blended learning model according to the needs of students with autism as an alternative learning model in schools. 2) The school is expected to consider the blended learning model in determining alternative learning model policies from the online learning model currently implemented in schools. 3) Future researchers are expected to be able to further examine the effectiveness of the blended learning learning model on learning outcomes of multiplication operations at the class and other school levels so that there are generalizations about the results of the study and use other types of assessment such as performance appraisals.

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