UJME 12 (1) 2023: 23-33
UNNES JOURNAL OF MATHEMATICS EDUCATION
https://journal.unnes.ac.id/sju/index.php/ujme/
ISSN: 2252-6927 (print); 2460-5840 (online)

The Effectiveness of the Use of Assistive Technology *Malitung* for Learning Outcomes of Students with Mild Intellectual Disabilities

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ARTICLE INFO

Article history:
Received 18 March 2023
Received in revised form 27 March 2023
Accepted 31 March 2023

Keywords:
Effectiveness; Assistive technology; Learning outcomes; Mild intellectual disabilities.

Abstract

The purposes of this research were to test the effectiveness of the use of assistive technology *malitung* (*manik*, *tali*, *hitung*) for learning outcomes of students with mild intellectual disabilities in basic arithmetic operations topic and describe their learning outcomes when using assistive technology *malitung* at Ungaran Public Special School. The method used in this research was Single Subject Research (SSR) with A-B-A design followed by qualitative descriptive research. Data collection techniques used in this research were observation, interviews, questionnaires, and tests. The data analysis techniques used in this research were descriptive statistics, data reduction, data presentation, data interpretation, and conclusion drawing. There were 3 students as research subjects who were students of class IX-C at Ungaran Public Special School. The results of this study are that the learning outcomes of the three research subjects in terms of cognitive, affective, and psychomotor aspects increased and reached category pretty good, good, and very good categories in learning using assistive technology *malitung*. These results were reinforced by very positive responses from Research Subjects 1 and 3 and positive responses from Research Subjects 2. The conclusions obtained were 1) the use of assistive technology *malitung* effective on the learning outcomes of students with mild intellectual disabilities on basic arithmetic operations material at Ungaran Public Special School, 2) basic arithmetic operations ability, curiosity, accuracy, responsibility, never give up, enthusiasm for learning, confidence, and interest in learning, problem-solving skills related to addition, subtraction, multiplication, and division operations were achieved in pretty good, good, and very good categories in learning by using assistive technology *malitung*.

1. Introduction

Act of The Republic of Indonesia Number 20, 2003 concerning the National Education System, chapter IV article 5 paragraph 1 reads "Every citizen has the same right to obtain quality education". Followed by paragraph 2 which reads "Citizens who have physical, emotional, mental, intellectual and/or social disabilities have the right to obtain special education". Based on these two statements, children with special needs have the right to quality education. Based on the Government Regulation of the Republic of Indonesia Number 57 of 2021 concerning National Education Standards, these principles are 1) support the implementation of active, creative, collaborative, fun and effective learning, 2) ensure security, health, and safety, 3) be friendly to persons with disabilities, and 4) friendly towards environmental sustainability.

One type of disability is intellectual disabilities. Intellectual abnormalities in students with intellectual disabilities hinder them in learning mathematics so that modifications are needed in a more concrete direction in the learning process (Khoiriyah & Pradipta, 2017). The American Psychological Association (APA) quoted by Mangunsong (2008) in Damastuti (2021) states that intellectual disabilities can be

To cite this article:
Firdausi, U. M. & Sugiman (2023). The Effectiveness of the Use of Assistive Technology Malitung for Learning Outcomes of Students with Mild Intellectual Disabilities. *Unnes Journal of Mathematics Education, 12*(1), 23-33. doi: 10.15294/ujme.v12i1.67415

classified into 4 categories based on the level of intelligence or IQ score, namely mild (IQ 55-70), moderate (IQ 40-55), severe (IQ 25-40), and profound (IQ below 25). There is an additional category in The American Psychological Association (APA) classification based on Brown et al. (1996) in Damastuti, (2021) namely borderline which has an IQ score of 71-85.

The researcher conducted an orientation towards the learning outcomes of students with mild intellectual disabilities in class IX-C at Ungaran Public Special School. The facts obtained are that student learning outcomes are classified as low and the teaching aids are inadequate to support learning. In addition, the limited educational staff caused class VII, VIII, and IX to join into an integration class with one class teacher. Based on the results of the interviews, the class teacher said that the material given to students in grades VII, VIII, and IX was the same and simultaneously. Through such a learning design, class teachers use the classical average system to determine the achievement of learning objectives. However, this causes individual services not to be carried out optimally. This raises the problem of not achieving basic competence in class IX students which should be achieved in class VII and VIII. Although based on the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 157 of 2014 concerning the Special Education Curriculum that learning for students with disabilities or special needs is developed based on the results of student assessments, this problem must be addressed immediately. If problems related to the inability of class IX students to achieve competencies that should have been achieved at the previous level are not resolved immediately, it will have an impact on achieving the expected competencies according to their level or the next level.

One of the abilities needed in learning mathematics is the ability to count. The ability to count of students with intellectual disabilities has benefits in daily activities, for example when buying food or equipment, managing finances in a simple way, buying medicines, and using public transportation (Hestyaningsih & Pratisti, 2021). In addition to the characteristics of intellectual barriers, students with mild intellectual disabilities also have the characteristics of being easily forgetful, easily distracted, and difficult to understand abstract things (Wijaya, 2013 in Apriani & Tarsidi (2018). This statement is in accordance with the results of interviews with class teachers that students with mild intellectual disabilities are not necessarily able to understand the material with one lesson and easily forget about the material that has been studied so that learning must be done repeatedly. To overcome this, a learning design is needed that can utilize visual aids in accordance with the characteristics of students with mild intellectual disabilities based on the results of an analysis of student needs related to the selected material. Teaching aids are used to assist students in experiencing real mathematics based on clear and visible facts so that the topics presented will be easy to understand. However, the reality that occurs in schools, teaching aids are rarely used in learning mathematics (Manurung et al., 2021).

In addition to counting skills related to cognitive aspects, observations of affective and psychomotor aspects are also carried out because they are in accordance with the statement that education is not only a process of transferring knowledge from teachers to students, but education also needs to be based on national character and local culture rooted in religious and cultural values (Zakiyah & Rusdiana, 2014). The world of education faces increasingly demanding demands, especially in preparing students to be able to face various changes that continue to grow, resulting in shifting aspects of values and morals in people's lives, moral decadence and bad character shown by students are examples of an inseparable part of the world of education (Nazmudin et al., 2022).

One alternative solution that can be done to overcome the problem description is the use of assistive technology in learning. According to Damastuti (2021), assistive technology is a tool designed or modified to help improve and develop the abilities of children with special needs related to everyday and academic life. Effective application of assistive technology in education can help to overcome functional barriers experienced by students with special needs and provide them with the same learning opportunities as students in general.

Based on these alternative solutions, this research focuses on the effectiveness of the use of assistive technology *malitung* for learning outcomes of students with mild intellectual disabilities in basic arithmetic operations topic (addition, multiplication, and division) at Ungaran Public Special School. The purposes of this research were to test the effectiveness of the use of assistive technology *malitung* (*manik, tali, hitung*) for learning outcomes of students with mild intellectual disabilities in basic arithmetic operations topic and describe their learning outcomes when using assistive technology *malitung* at Ungaran Public Special School. Assistive technology *malitung* is an integration of teaching aids in the form of beads and strings

integrated with scratch in the form of visual programming to support learning basic arithmetic operations for students with special needs. *Malitung* is an acronym for beads (*manik*), ropes (*tali*), and count (*hitung*) which is made to support students with mild intellectual disabilities in learning on basic arithmetic operations topic.

2. Methods

The approach used in this study is mixed methods which is a combination of quantitative and qualitative approaches. This study applies a quantitative approach using the Single Subject Research (SSR) method, followed by a qualitative approach using a qualitative descriptive method. Single Subject Research (SSR) is an experimental research method to view and evaluate the behaviour of a single subject towards a particular intervention with research that is carried out repeatedly in a certain time.

The research design used is the ABA design which is the basic design in Single Subject Research (SSR) research. The ABA design consists of 3 phases, namely the baseline-1 phase which is symbolized by A1, the intervention phase which is symbolized by B, and the baseline-2 phase which is symbolized by A2. The baseline-1 and baseline-2 phases are meant to be learning without using assistive *malitung* technology while the intervention phase is learning using assistive *malitung* technology. Learning in the baseline-1 phase was carried out at meetings 1, 2, and 3. Learning in the intervention phase was carried out at meetings 4, 5, and 6. Learning in the baseline-2 phase was carried out at meetings 7, 8, and 9. After obtaining data on baseline-1 phase, then the intervention is applied to the subject. During this phase, researchers will carry out measurements on an ongoing basis until the data is stable. After the data is stable, the researcher continues the research to the baseline-2 phase, which is the phase when the intervention is withdrawn. If there is a change in the phase when the intervention is withdrawn and returns to its original state, it can be concluded that there is an influence on the intervention applied (Prahmana, 2021).

Data collection techniques used were 1) tests, to measure cognitive aspects, namely students' numeracy skills, 2) interviews, to find out descriptions of learning outcomes, 3) observation, to find out descriptions of effectiveness and student learning outcomes, and 4) questionnaires, to find out responses students on the use of assistive technology *malitung* so that it can strengthen the results of the assessment of the cognitive, affective, and psychomotor aspects of students in learning. The data analysis techniques used are 1) descriptive statistics, which are presented in the form of graphs and tables based on the results of analysis within and between conditions in accordance with the Single Subject Research (SSR) method, 2) data reduction, which is carried out on the results of interviews and student observations, 3) presentation of data, which is compiled based on the results of data reduction in the form of narrative,

This research was conducted on 3 research subjects who had the characteristics of 1) class IX-C (code C is the code for mild intellectual disabilities class), 2) having difficulties in answering questions related to the arithmetic operations of addition, subtraction, multiplication, or division, and 3) can communicate well and fluently. The observed and measured learning outcomes are as follows.

a. Cognitive Aspect

The cognitive aspect in question relates to students' numeracy skills with indicators namely 1) knowing the operation of adding two numbers to a maximum of 100, 2) knowing the operation of subtracting two numbers to a maximum of 100, 3) carrying out the operation of adding two numbers to a maximum of 100, 4) carrying out the operation of subtracting two numbers to a maximum 100, 5) get to know the concept of multiplying two natural numbers whose result is up to 20 using a concrete object, 6) get to know the concept of dividing two natural numbers whose result is up to 20 using a concrete object, 7) calculating the product of the multiplication of two natural numbers whose result is up to 20, and 8) calculating the result of the division of two natural numbers whose result is up to 20.

b. Affective Aspect

The affective aspects that were observed and measured were 1) curiosity (OA1), 2) thoroughness (OA2), 3) responsibility (OA3), 4) never giving up (OA4), 5) enthusiasm for learning (OA5), 6) trust self (OA6), and 7) interest in learning (OA7).

c. Psychomotor Aspect

The psychomotor aspects that were observed and measured were 1) solving problems related to addition arithmetic operations (OP1), 2) solving problems related to subtraction arithmetic operations (OP2), 3) solving problems related to multiplication arithmetic operations (OP3), and 4) solving problems related to operations calculate division (OP4).

Before conducting the research, the author already has a prototype of Assistive technology *malitung*. Figure 1 shows the board components covered by galvalume and sticker paper. Motherboard side 1 is used for addition and subtraction arithmetic operations. Main board side 2 is used for multiplication and division arithmetic operations. The multilevel addition and subtraction board is used for short multiplication addition and subtraction operations.

a b c

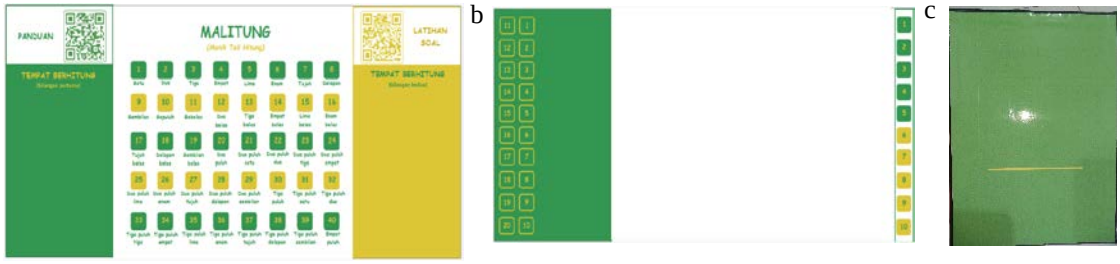


Figure 1. (a) Main board side 1; (b) Main board side 2; (c) Sum Board and Stranded reduction

On the main board side 1 there are 2 QR Codes which contain guidebooks and practice questions as shown in Figure 2.

a b

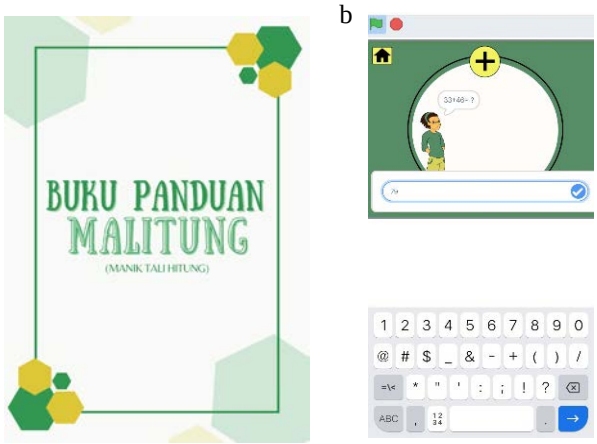


Figure 2. (a) manual cover; (b) display of practice questions

The main components of assistive technology *malitung* are beads as shown in Figure 3a and rope as shown in Figure 3b. Apart from beads and strings, assistive technology *malitung* also consists of several number plates, symbols for arithmetic operations, and blank plates (for multilevel addition and subtraction boards) as shown in Figure 3c. Beads, string, and the plates are given a magnetic coating so they can stick to the board.

a b c

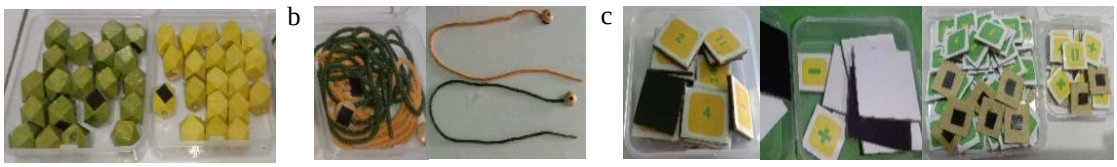


Figure 3. (a) beads; (b) rope; (c) number plates, operation symbols, and blanks

3. Results & Discussions

3.1. The Effectiveness of Using Assistive Technology Malitung

a. Cognitive Aspect

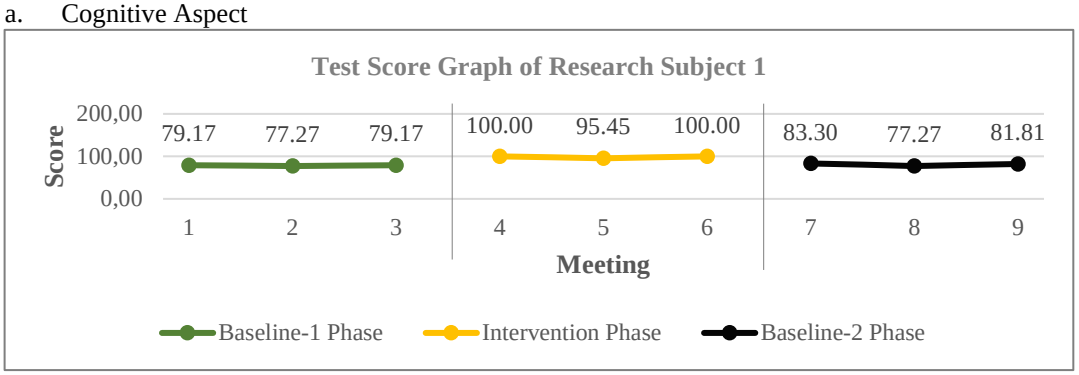


Figure 4. Test Score Graph of Research Subject 1

Table 1. Analysis of the Conditions of Research Subject 1

No.	Phase	A1	B	A2
1.	Condition length	3	3	3
2.	Directional trend	(=)	(=)	(-)
3.	Stability trend	Stable (100%)	Stable (100%)	Stable (100%)
4.	Trace trend	(=)	(=)	(-)
5.	Stability level and range	Stable $74.57 - 82.49$	Stable $93.61 - 103.61$	Stable $76.63 - 84.97$
6.	Level change	0 (=)	0 (=)	1.52 (-)

Table 2. Analysis of Inter-Conditions of Research Subject 1

No.	Phase	B/A1	B/A2
1.	Number of variables changed	1	1
2.	Changes in trend direction and their effects	(=) (=)	(-) (=)
		No changes	Positive
3.	Changes in the trend of stability	Stable to Stable	Stable to Stable
4.	Level change	(+) 20.83	(+) 16.67
5.	Overlap percentage	0%	0%

Based on Table 1 of the baseline-1 phase, the trend towards the resulting data points is stable or flat. The stability trend obtained is 100% stable with a range of 74.57 to 82.49. The trend of the traces obtained is stable or horizontal. The level change obtained was 0, which means that there was no change in test results that occurred at the initial and final meetings in the baseline-1 phase.

Based on Table 1 of the intervention phase, the trend towards the resulting data points is stable or flat. The trend of stability obtained is 100% stable with a range of 93.61 to 103.61. The trend of the traces obtained is stable or horizontal. The change in level obtained was 0, which means that there was no change in test results that occurred at the beginning and end of the meeting in the intervention phase.

Based on Table 1 of the baseline-2 phase, the trend towards the resulting data points is decreasing. The stability trend obtained is 100% stable with a range of 76.63 to 84.97. The trend of the traces obtained is decreasing. The change in level obtained was 1.52 (-) which means that the test results decreased by 1.52 points from the initial data point to the end of the meeting in the baseline-2 phase.

Based on Table 2, the change in trend direction from baseline-1 to the intervention phase is flat to flat so that the effect is no change. The change in trend direction from the baseline-2 phase to the intervention phase is decreasing to a flat so that the effect is positive. Changes in the trend of stability from the baseline-

2 phase to the intervention phase and from the baseline-1 phase to the intervention phase were stable to stable. The change in level from the baseline-1 phase to the intervention phase was (+) 20.83, which means that the points had increased by 20.83 while the change in level from the baseline-2 phase to the intervention phase was (+) 16.67, which meant that the points had increased by 16.67.

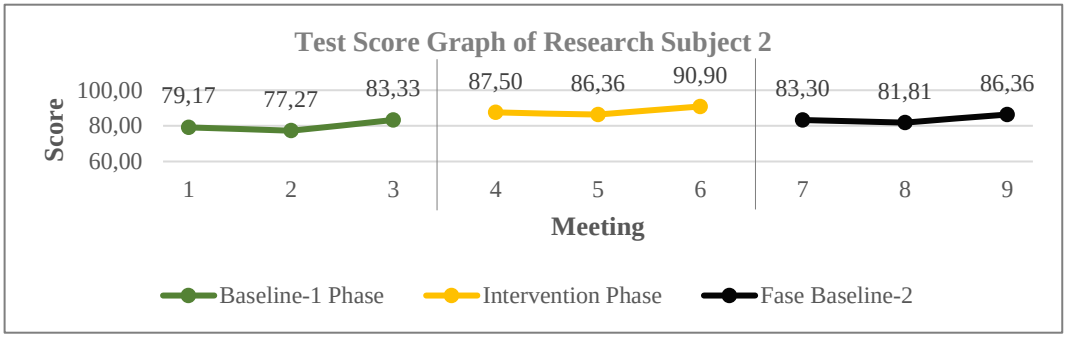


Figure 5. Test Score Graph of Research Subject 2

Table 3. Analysis of The Conditions of The Research Subject 2

No.	Phase	A1	B	A2
1.	Condition length	3	3	3
2.	Directional trend	(+)	(+)	(+)
3.	Stability trend	Stable (100%)	Stable (100%)	Stable (100%)
4.	Trace trend	(+)	(+)	(+)
5.	Stability level and range	Stable $75.75 - 84.09$	Stable $83.70 - 92.80$	Stable $79.51 - 88.15$
6.	Level change	4.16 (+)	3.4 (+)	3.03 (+)

Table 4. Analysis of Inter-Conditions of Research Subject 2

No.	Phase	B/A1	B/A2
1.	Number of variables changed	1	1
2.	Changes in trend direction and their effects	(+) (+)	(+) (+)
3.	Changes in the trend of stability	Positive Stable to Stable	Positive Stable to Stable
4.	Level change	(+) 4.17	(+) 7.57
5.	Overlap percentage	0%	66.67%

Based on Table 3 of the baseline-1 phase, the trend towards the resulting data points is increasing. The trend of stability obtained is 100% stable with a range of 75.75 to 84.09. The trend of the traces obtained is increasing. The change in level obtained was 4.16 (+), which means that there was an increase in test results by 3.14 points at the initial and final meetings of the baseline-1 phase.

Based on Table 3 of the intervention phase, the trend toward the resulting data points is increasing. The stability trend obtained is 100% stable with a range of 83.70 to 92.80. The trend of the traces obtained is increasing. The change in level obtained was 3.4 (+), which means that there was an increase in test results by 3.4 points at the initial and final meetings during the intervention phase.

Based on Table 3 of the baseline-2 phase, the trend towards the resulting data points is increasing. The stability trend obtained is 100% stable with a range of 79.51 to 88.15. The trend of the traces obtained is increasing. The change in level obtained was 3.03 (+), which means that the test results increased by 3.03 points from the initial data point to the end of the meeting in the baseline-2 phase.

Based on Table 4, the change in trend direction from the baseline-1 and baseline-2 phases to the intervention phase is increasing to increasing so that the effect is positive. The positive result in question is a condition that still shows good results with an increase in test results. Changes in the trend of stability from the baseline-1 phase to the intervention phase and from the baseline-2 phase to the intervention phase were stable to stable. The change in level from the baseline-1 phase to the intervention phase was (+) 4.17, which means that the test results increased by 4.17 points, while the change in level from the baseline-2 phase to the intervention phase was (+) 7.57, which means the points experienced an increase of 7.57 points. The percentage of overlap between the data in the baseline-1 phase with the intervention was 0%, while the percentage between the data in the baseline-2 phase with the intervention was 66.7%. The percentage determines the effect of giving the intervention. The smaller the percentage of overlap, the better the influence. The percentage of 0% between the data in the baseline-1 phase and the intervention shows that the effect of giving the intervention is very good, while the percentage of 66.7% between the data in the baseline-2 phase and the intervention phase shows that the intervention has little effect on learning when the intervention is withdrawn. This is indicated by the presence of two data points or values in the intervention phase which are in the baseline-2 phase range. The percentage of 0% between the data in the baseline-1 phase and the intervention shows that the effect of giving the intervention is very good, while the percentage of 66.7% between the data in the baseline-2 phase and the intervention phase shows that the intervention has little effect on learning when the intervention is withdrawn. This is indicated by the presence of two data points or values in the intervention phase which are in the baseline-2 phase range. The percentage of 0% between the data in the baseline-1 phase and the intervention shows that the effect of giving the intervention is very good, while the percentage of 66.7% between the data in the baseline-2 phase and the intervention phase shows that the intervention has little effect on learning when the intervention is withdrawn. This is indicated by the presence of two data points or values in the intervention phase which are in the baseline-2 phase range.

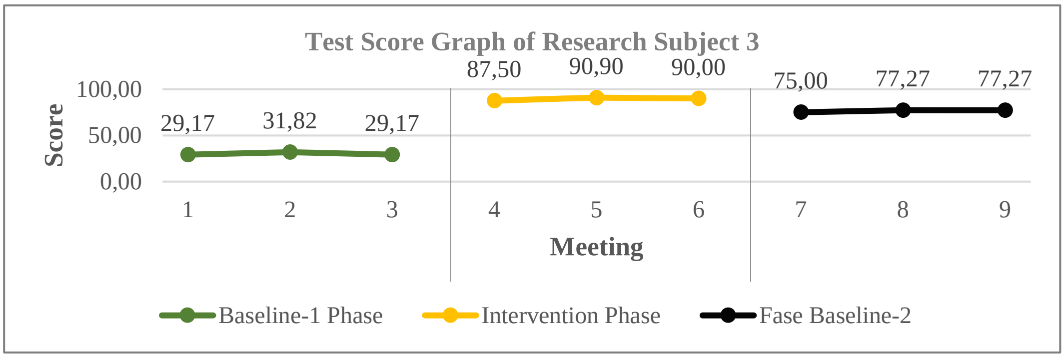


Figure 6. Test Score Graph of Research Subject 3

Table 5. Analysis of The Conditions of The Research Subject 3

No.	Phase	A1	B	A2
1.	Condition length	3	3	3
2.	Directional trend	(=)	(+)	(+)
3.	Stability trend	Stable (100%)	Stable (100%)	Stable (100%)
4.	Trace trend	(=)	(+)	(+)
5.	Stability level and range	Stable 27.66 – 32.44	Stable 85.22 – 94.32	Stable 72.64 – 80.38
6.	Level change	0 (=)	3.4 (+)	2.27 (+)

Table 6. Analysis of Inter-Conditions of Research Subject 3

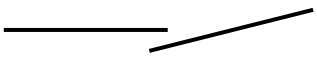
No.	Phase	B/A1	B/A2
1.	Number of variables changed	1	1
2.	Changes in trend direction and their effects	 (=) (+)	 (+) (+)
3.	Changes in the trend of stability	Positive Stable to Stable	Positive Stable to Stable
4.	Level change	(+) 58.33	(+) 15.9
5.	Overlap percentage	0%	0%

Table 7. Affective Aspect Result

Research subject	Phase	Dimension Code						
		OA1	**OA2**	**OA3**	**OA4**	**OA5**	**OA6**	**OA7**
S1	A1	2.89 (B)	2.5 (B)	3 (B)	2.33 (C)	3 (B)	2.5 (B)	2.83 (B)
	B	3.57 (SB)	3.17 (B)	3.83 (B)	3.67 (SB)	3.67 (SB)	3.5 (SB)	4 (SB)
	A2	2.77 (B)	2.67 (B)	3 (B)	2.67 (B)	3 (B)	3 (B)	3 (B)
S2	A1	2.11 (C)	2.83 (B)	3 (B)	3 (B)	2.33 (C)	2.67 (B)	2.67 (B)
	B	3.33 (B)	3 (B)	3.5 (SB)	4 (SB)	3 (B)	3.33 (B)	3.33 (B)
	A2	2.33 (C)	3 (B)	3 (B)	3 (B)	2 (C)	3 (B)	2.83 (B)
S3	A1	2, 33 (C)	2.5 (B)	3 (B)	2 (C)	3 (B)	2 (C)	3.17 (B)
	B	3 (B)	3 (B)	3.5 (SB)	3.33 (B)	3.33 (B)	3.33 (B)	3.83 (SB)
	A2	2.56 (B)	3 (B)	3.33 (B)	3 (B)	3 (B)	3.17 (B)	3 (B)

Based on Table 5 in the baseline-1 phase, the trend towards the resulting data points is stable or flat. The stability trend obtained is 100% stable with a range of 27.66 to 32.44. The trend of the traces obtained is stable or horizontal. The change in level obtained was 0 (=), which means that there was no change in the test results at the initial and final meetings of the baseline-1 phase.

Based on Table 5 in the intervention phase, the trend toward the resulting data points is increasing. The stability trend obtained is 100% stable with a range of 85.22 to 94.32. The trend of the traces obtained is increasing. The change in level obtained was 3.4 (+), which means that the test results increased by 3.4 points from the data point at the initial meeting to the end during the intervention phase.

Based on Table 5 in the baseline-2 phase, the trend toward the resulting data points is increasing. The trend of stability obtained is 100% stable with a range of 72.64 to 80.38. The trend of the traces obtained is increasing. The change in level obtained was 2.27 (+), which means that the test results had increased by 2.27 points from the data points at the initial to the final meeting in the baseline-2 phase.

Based on Table 6, the change in trend direction from the baseline-1 phase to the intervention phase is flat to increasing so that the effect is positive. The positive results in question are conditions in the intervention phase where the changes tend to increase compared to the baseline-1 phase. The change in trend direction from the baseline-2 phase to the intervention phase is increasing to increasing so that the effect is positive. The positive result in question is a condition that still shows good results with an increase in test results. Changes in the trend of stability from the baseline-1 phase to the intervention phase and from the baseline-2 phase to the intervention phase were stable to stable. The change in level from the baseline-1 phase to the intervention phase was (+) 58.33, which means that the test results had increased by 58.33 points while the change in level from the baseline-2 phase to the intervention phase was (+) 15.9, which means that the points had increased by 15.9 points. The percentage of overlap between the data in the

baseline-1 phase and the intervention and between the data in the baseline-2 phase and the intervention was 0%, which means that the intervention had a very good effect on improving the S3 test results.

b. Affective Aspect

The following are the results of the assessment of the affective aspects of the three research subjects in learning using assistive technology *malitung*.

c. Psychomotor Aspects

The following are the results of the assessment of the psychomotor aspects of the three research subjects in learning using assistive technology *malitung*.

Table 8. Psychomotor Aspect Result

Research subject	Phase	Dimension Code			
		OP1	**OP2**	**OP3**	**OP4**
S1	A1	2.33 (C)	2.17 (C)	3.67 (SB)	3.67 (SB)
	B	3.67 (SB)	3.5 (SB)	4 (SB)	4 (SB)
	A2	3 (B)	3 (B)	3.67 (SB)	3.67 (SB)
S2	A1	2.5 (B)	2.33 (C)	3.67 (SB)	3.67 (SB)
	B	3.5 (SB)	3.33 (B)	4 (SB)	4 (SB)
	A2	3.5 (SB)	2.83 (B)	3.67 (SB)	4 (SB)
S3	A1	2 (C)	2 (C)	1.33 (K)	1.33 (K)
	B	3.67 (SB)	3.67 (SB)	3.67 (SB)	3.5 (SB)
	A2	3 (B)	3 (B)	3.67 (SB)	3.5 (SB)

Based on analysis within and between conditions, the cognitive aspects of the three research subjects experienced an increase in the intervention phase (B). The increase was caused by the administration of the intervention as evidenced by the test results obtained in the baseline-2 phase (the phase when the intervention was withdrawn) which experienced a decrease. This increase indicates that the ability to calculate basic arithmetic operations in the intervention phase has increased as evidenced by the results of tests and interviews conducted on the three research subjects. In addition, the average value of the affective and psychomotor aspects of the three research subjects also increased from the baseline-1 phase to the intervention phase. Therefore, the use of assistive technology *malitung* effective against the learning outcomes of the three research subjects.

3.2. Description of Learning Outcomes in Learning Using Assistive Technology Malitung

a. Cognitive Aspect

S1 achieves very good category on all indicators of cognitive aspects related to the ability to calculate basic arithmetic operations. The use of assistive *malitung* technology in learning can improve the cognitive aspects of S1. This is known from positive or good changes in the form of increasing test scores from learning without using it to learning using assistive technology *malitung*.

S2 obtains very good results on indicators of knowing the operation of adding two numbers up to a maximum of 100, knowing the operation of adding two numbers up to a maximum of 100, carrying out the operation of adding two numbers up to a maximum of 100, getting to know the concept of dividing two natural numbers which results up to 20 using concrete objects, calculating multiplication results two natural numbers whose result is up to 20, and calculating the result of dividing two natural numbers whose result is up to 20. S2 gets good results on the indicator performing a two-digit subtraction operation with a maximum of 100. S2 gets pretty good results on the indicator getting to know the concept of multiplying two numbers original which results up to 20 using concrete objects.

S3 achieves a very good category on indicators of knowing the operation of adding two digits to a maximum of 100, knowing the operation of subtracting two digits to a maximum of 100, performing addition operations of two digits to a maximum of 100, performing subtraction of two digits to a maximum of 100, knowing the concept of dividing two natural numbers with a result of up to 20 using concrete objects, and calculating the product of the multiplication of two natural numbers whose result is up to 20. S3 achieves a good category on the indicator of calculating the result of the division of two natural numbers whose result is up to 20. S3 achieves a pretty good category on the indicator of knowing the concept of multiplying two numbers original which results up to 20 using concrete objects.

b. Affective Aspect

In learning using assistive *malitung* technology, S1 achieves a good category in the dimension of accuracy. S1 has also achieved a very good category on the dimensions of curiosity, responsibility, never giving up, enthusiasm for learning, self-confidence, and interest in learning. S2 achieves a very good category on the dimensions of responsibility and never give up. S2 achieved a good category on the dimensions of curiosity, thoroughness, enthusiasm for learning, self-confidence, and interest in learning. S3 achieved a very good category on the dimensions of responsibility and interest in learning. S3 achieved a good category on the dimensions of curiosity, thoroughness, never giving up, enthusiasm for learning, and self-confidence.

c. Psychomotor Aspect

In learning using assistive *malitung* technology, S1 achieved very good results in the dimensions of solving problems related to the arithmetic operations of addition, subtraction, multiplication, and division. S2 achieves a very good category on solving dimensions related to addition, multiplication, and division arithmetic operations. S2 achieves a good category on the dimensions of solving problems related to subtraction arithmetic operations. S3 has achieved an excellent category on the dimension of solving problems related to addition, subtraction, multiplication, and division arithmetic operations.

4. Conclusion

Based on the results of the research and discussion regarding the effectiveness of using assistive technology *malitung* on the learning outcomes of students with mild intellectual disabilities in basic arithmetic operations topic at Ungaran Public Special School, the following conclusions are obtained.

The test results of the three research subjects related to the ability to calculate basic arithmetic operations experienced an increase from the baseline-1 phase to the intervention phase. This increase was due to the use of assistive technology *malitung* as evidenced by the decreased test results from the intervention phase to the baseline-2 phase. The results of observing the affective and psychomotor aspects of the three research subjects also experienced an increase from the baseline-1 phase to the intervention phase. So, it can be concluded that the use of assistive technology *malitung* is effective on the learning outcomes of the three research subjects who are students with mild intellectual disabilities in basic arithmetic operations material at Ungaran Public Special School. This was reinforced by a very positive response from S1 of 98.21%, a positive response from S2 of 82.14%, and a very positive response from S3 of 100%.

The indicator recognizes the operation of adding two numbers up to a maximum of 100, knows the operation of subtracting two numbers up to a maximum of 100, performs the operation of adding two numbers up to a maximum of 100, knows the concept of dividing two natural numbers whose result is up to 20 using concrete objects and calculating the multiplication of two natural numbers whose result is up to 20 achieved in very good category by S1, S2, and S3. The indicator performing a two-digit subtraction operation with a maximum of 100 is achieved in a very good category by S1 and S2, while S3 achieves a good category. The indicator recognizes the concept of multiplying two natural numbers whose result is up to 20 using concrete objects achieved in a very good category by S1, while S2 and S3 reach a pretty good category. The indicator calculates the results of the division of two natural numbers whose results up to 20 are achieved in the very good category by S1 and S2, while S3 reaches the good category. In general, the cognitive aspects related to the numeracy skills of students with mild intellectual disabilities in learning using assistive technology *malitung* reach the very good category.

The curiosity dimension was achieved in a very good category by S1, while S2 and S3 achieved a good category. The dimension of accuracy is achieved in good category by S1, S2, and S3. The responsibility dimension is achieved in very good categories by S1, S2, and S3. The unyielding dimension is achieved in a very good category by S1 and S2, while S3 achieves a good category. The dimensions of enthusiasm for learning and self-confidence were achieved in very good categories by S1, while S2 and S3 achieved good categories. The dimension of interest in learning is achieved in a very good category by S1 and S3, while S2 achieves a good category. In general, the affective aspects of students with mild intellectual disabilities in learning using assistive technology *malitung* reach a very good category on the dimensions of curiosity, responsibility, never give up, enthusiasm for learning, self-confidence, and interest in learning. Meanwhile, the dimensions of accuracy of students with mild intellectual disabilities in reached the good category.

The dimensions of solving problems related to addition, multiplication, and division arithmetic operations were achieved in very good categories by S1, S2, and S3. The dimensions of solving problems

related to arithmetic subtraction operations were achieved in a very good category by S1 and S3, while S2 achieved a good category. In general, the psychomotor aspects of students with mild intellectual disabilities reach the very good category.

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