Use of Educational Game Media Calculations to Improve Summary Calculations in Students with Intellectual Disability

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A B S T R A C T S

This study aims to improve numeracy skills with intellectual disability students through numeracy educational games media. The research method used is Classroom Action Research using demonstration learning methods. The research subjects were 2 (two) people at the Border State Special School. The results of the study showed an increase in students' ability in addition to counting after using the media of numeracy educational games. Where the value of the results of the teaching and learning process shows an increase and is in accordance with the existing Minimum Completeness Criteria. The success of this numeracy educational game media is because it is interesting for students and easy to follow. This study demonstrates that the use of numeracy educational games is easy to understand and has an impact on increasing the numeracy ability with intellectual disability students.

A R T I C L E   I N F O

1. INTRODUCTION

Learning media is a tool that can be used by teachers to convey information to students related to learning so that it is easy to understand (Wahyuningtyas & Sulasmono, 2020). Educational games are games that have been specifically designed to teach students (users) a certain lesson, develop concepts and understanding and guide them in practicing their abilities, and motivate them to play it (Amanda & Rianto, 2018). The educational game media referred to here are electronic educational game media, namely educational game media played with the help of electronic devices; such as computers, smartphones, tablets.

Children with intellectual disabilities are part of children with special needs From a physical, intellectual, social, and emotional point of view, children with intellectual disabilities are children who have deficiencies or limitations in terms of their intellectual mentality below the normal average so that they experience difficulties in academic, communication, and social tasks, and require special education services (Hendra, 2012).

One example of the math academic fields is the addition. The addition is the activity of adding one number to another so that it becomes a complete number result, such as 1 + 3 = 4, 2 + 3 = 5 (Hendra, 2012).

Currently, many studies discussed the understanding of arithmetic addition, including Improving Operational Ability of Addition in the Field of Mathematics Studies through Picture Media for Mild Mentally Impaired Children Class II Blora State Elementary School Semester II Year 2009/2010 (Bjork & Bowyer-Crane, 2013), "Improving Counting Ability through Number Card Game Media for Mild Mentally Impaired Students in Elementary Class II Special School (Taufiq *et al.,* 2020), "Contribution of general cognitive abilities and specific number skills toward arithmetic performance in students with mild intellectual disability" (Soltani & Mirhosseini, 2020), "Improving Outcomes Learning Counting Addition through Learning Media for Mild Mentally Impaired Students Special School" (Nauri *et al.,* 2019). But until now there has been no research that discusses how to increase the ability to add arithmetic through the use of educational game media counting on mild with intellectual disability students in grade 2 (two) Extraordinary Elementary School.

The goal to be achieved through this research is to increase the ability to add arithmetic to students with mild mental retardation in grade 2 (two) Elementary School Extraordinary through the media of educational games with numeracy. In particular, through this research, it is hoped that changes that occur in mild with intellectual disability children related to the ability to count in addition to 10. The research method used is Classroom Action Research because this research tries to solve problems that occur in the classroom during mathematics learning, namely arithmetic operation ability problem. The learning method is demonstration. The research subjects amounted to 2 (two) grade II students at the Extraordinary Elementary School at the Border State Special School, Kuningan Regency. The results of the study showed an increase in students' ability in addition to counting after using the media of numeracy educational games. Where the value of the objective test results at the end of the cycle shows an increase and is in accordance with the existing Minimum Completeness Criteria. The success of this educational game media is because it is interesting for students and easy to follow. This study demonstrates that the use of educational games is easy to understand and has an impact on improving students' abilities.

2. METHOD

2.1. Research subject and place

The subject of this research involved 2 (two) students with intellectual disabilities. The place of research is at the Sekolah Luar Biasa Negeri Perbatasan Kuningan. This school is a special school for children with special needs.

2.2. Research procedure

The research procedure used is Classroom Action Research because this research tries to solve problems that occur in the classroom during mathematics learning, namely the problem of the ability to add operations. The type of Classroom Action Research used is Participant Classroom Action research, which is a type of classroom action research that requires the researcher to be directly involved in the research process. The focus of the research is on the use of numeracy educational game media to improve the numeracy skills of students with intellectual disabilities.

2.3. Activity procedure

This study uses the model of Stephen Kemmis and Mc Taggart. Prihantoro and Hidayat (2019) argue this model is often quoted in books and articles and consists of four stages: planning (plan), action (act), observation (observe), and reflection (reflect). **Figure 1** describes the Classroom Action Research model carried out by the researcher which consists of planning, action, observation, and reflection.

Figure 1 explains that the research was carried out for three cycles. Research begins with planning activities, then research is carried out. At the time of carrying out the research, observations were made, and then reflection was carried out to determine the steps of the activities to be carried out next.

(i) Planning. This includes preparation of program design, learning action scenario, the teacher prepares a comfortable classroom and less distraction from the environment. This includes seat mapping, and the provision of rewards, Procurement of learning tools and media, Learning aids used are learning aids that are needed in accordance with the subject matter being taught, namely educational games that use electronic media such as tablets, smartphones. Other tools used are projectors and Student Worksheets.

(ii) Implementation. The plan that has been prepared is tried out in accordance with the steps that have been made, namely increasing the ability to calculate the sum of mild mentally retarded children through the addition of educational game media. The steps for implementing the action consist of three cycles and each cycle consists of two meetings.

(iii) Observation. Observations were made to observe the learning process and record all events due to actions taken using established observation procedures and data interpretation. This observation is carried out to see whether all the plans that have been made are implemented well or some deviations can affect the results that are less than optimal for children with mild mental retardation. Observations were made by the research team and data were recorded by filling in the values on the observation sheet.

(iv) Reflection. The data that has been obtained based on the results of observations and tests of learning outcomes are studied and analyzed and concludes the results of observations. The results of the reflection of the researcher and the team are used as material for consideration of whether the action was given in each cycle that is carried out needs to be repeated or can be continued for action in the next cycle to achieve the research objectives.
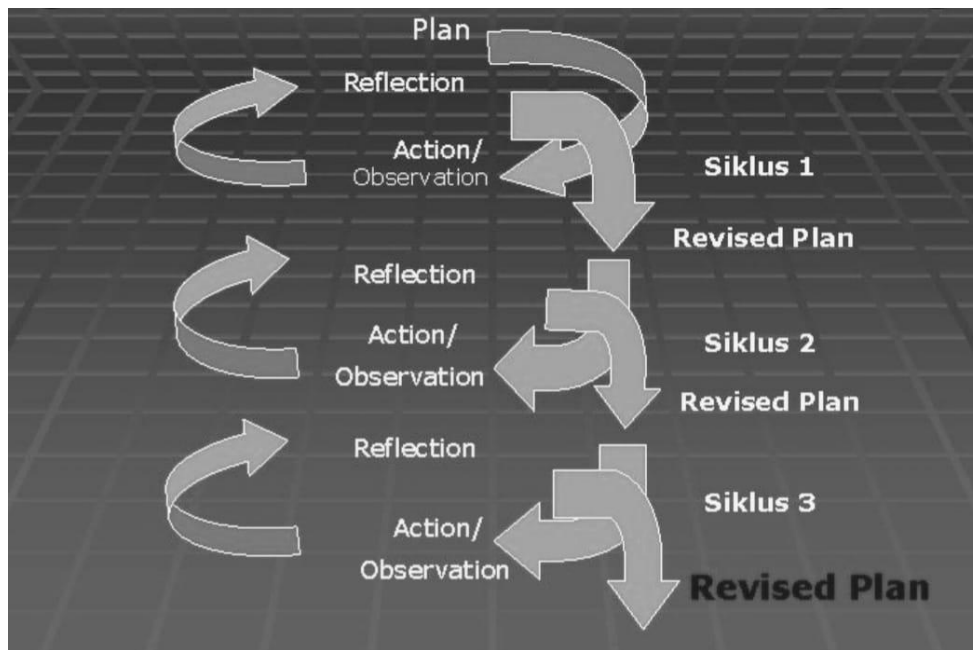
Figure 1. Screen shoot from multimedia adobe flash.

2.4. Research instruments

In our research activities, we collect data through test and observation activities. The test was carried out at the 1st and 2nd meetings of cycle I, the 1st and 2nd meetings of cycle II, as well as the 1st and 2nd meetings of cycle III. The test was done until the scores obtained by students matched or exceeded the Minimum Completeness Criteria. Observations are carried out to observe the learning process and record all events due to actions taken using predetermined observation and data interpretation procedures. We made the research instrument in the form of objective test questions and observation sheets.

3. RESULT AND DISCUSSION

3.1. Student demographics

The students who were used as subjects in this study were students with mild mental retardation in class II Extraordinary Elementary School. The number of students is 2 (two) people, namely CA and MN. **Table 1** describes the demographics of students consisting of motor skills, communication, concentration, language, and academics.

Table 1. The condition of students' abilities.

Name of Student	Motor Skil	Communication	Concentration	Language	Academic
CA	3	3	1	3	2
MN	4	4	2	3	2

Information:
1 = Very Less
2 = Less
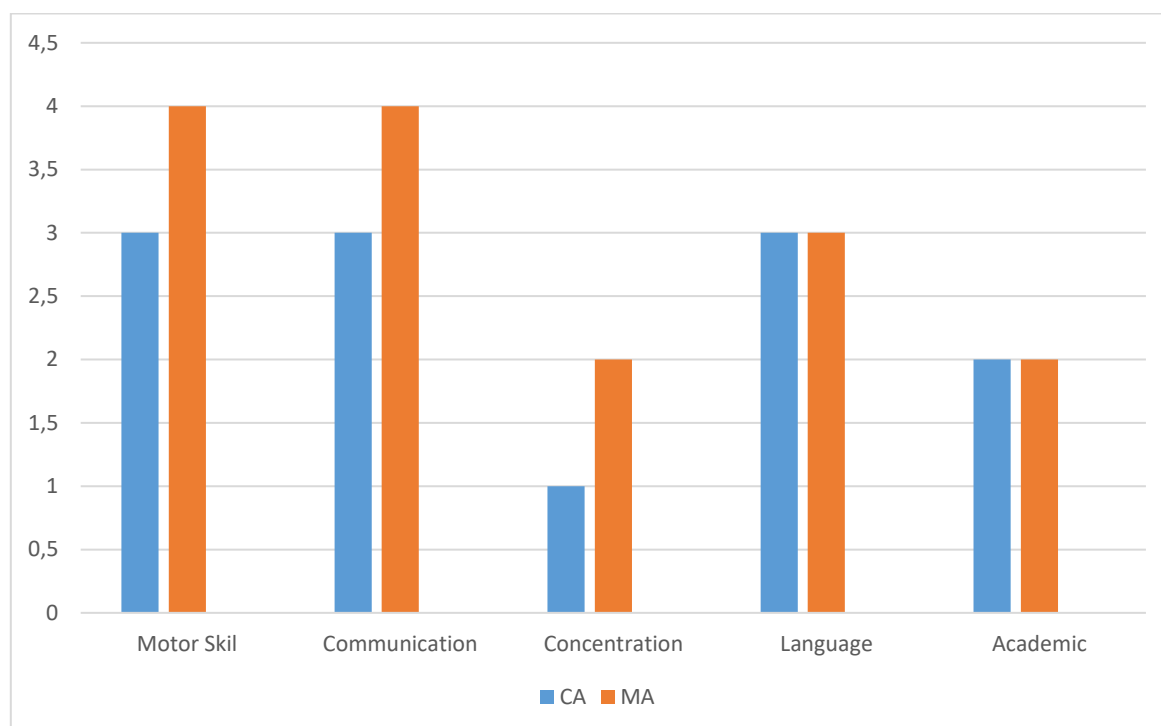3 = Enough
4 = Fine
5 = Very Good

Figure 2. Students' ability condition.

Table 1 and **Figure 2** illustrate that CA has quite good abilities in motor, communication aspects, still lacking or very poor abilities in academic and concentration aspects. MN has good skills in motor and communication aspects, quite good in language aspects, and not good in concentration and academic aspects. Overall MN ability is better than CA

3.2. Learning process
3.2.1. Initial activity
In the initial activities, student conditioning was carried out such as praying, attending, having conversations about objects around, and motivating students to try to count the many objects in the classroom or room.

3.2.2. Core activities
In the core activity, students name the objects shown by the teacher, do the sum of the many objects held by the students and those held by the teacher, do the sum of many objects up to 10, name the pictures that will be added up through counting game media, try to count the number of objects up to 10 using media games, trying to add up to 10 pictures of objects using games 3 times for each child. The core activity ended with working on counting objective questions, totaling 10 questions.

3.2.3. End activities
At the end of the activity, ask questions about working on objective questions, conclude the subject matter, and end with the reading of prayers.

3.2.4. Methods, Media and Learning Strategies
The learning process activities use the lecture, demonstration, and assignment methods. The media used were teacher books and student books for the 2013 Curriculum for Class II Special Schools, specific types of mild mental retardation, surrounding objects, Student Worksheets, and electronic media such as smartphones, tablets, and projectors. The learning strategy used is Cooperative Learning.

3.3. Research results
3.3.1. Pre cycle

To find out the initial ability to count, in addition, the following table shows the test results data collected through an objective test assessment, totaling 10 questions. **Table 2** describes the test results for adding up to 10 objects in the pre-cycle. CA got a score of 45 and MN got a score of 55. The value obtained by each of these students has not reached the expected Minimum Completeness Criteria. The problems faced by children with intellectual disabilities are difficulty understanding abstract things, poor concentration, poor experience, lack of initiative, forgetting quickly and so on (Hendra, 2012).

Table 2 explains that in the pre-cycle the objective test scores obtained by CA and MN were still below the Minumum Completeness Criteria. The value obtained by MN is greater than that of CA.

Table 2. Data of pre-cycle objective test results.

Number	Name of Student	Pre Cycle Value	Minimum Completeness Criteria
1.	CA	45	70
2.	MA	55	70

3.3.2. Cycle I

In the first cycle, the researcher began to use educational game media to develop students' numeracy skills. So far, the learning media used are monotonous and teachers teach using conventional methods so that this ineffective learning process can be overcome by using interactive learning media (Amanda & Rianto, 2018).

To determine the ability to calculate addition with the media of educational games for counting in cycle I, the following table shows the test result data collected through an objective test assessment, totaling 10 questions. **Table 3** describes the test results for adding up to 10 objects in cycle I. CA scored 52.5 and MN scored 57.5. The value obtained by each student has not reached the expected Minimum Completeness Criteria.

Table 3 explains that in the first cycle the objective test scores obtained by CA and MN are still below the Minimum Completeness Criteria as in the pre-cycle. The value obtained by MN is still greater than that of CA. The research will continue in cycle II.

Table 3. Data on the results of the objective test of the 1st and 2nd meeting cycle I.

Number	Name of Student	Meeting to	Value	Value of Cycle I	Minimum Completeness Criteria
1.	CA	1	50	52.5	70
		2	55		
2.	MN	1	55	57.5	70
		2	60		

3.3.3. Cycle II

To determine the ability to calculate addition using educational game media counting in cycle II, the following table shows the test results data collected through an objective test assessment, totaling 10 questions. **Table 4** describes the test results for adding up to 10 objects in cycle II. CA scored 65 and MN scored 67.5. The value obtained by each student has not reached the expected Minimum Completeness Criteria.

Table 4 explains that in cycle II the objective test scores obtained by CA and MN are still below the Minimum Completeness Criteria as in cycle I. The scores obtained by MN are still greater than CA. The research will continue in cycle III.

Table 4. Data on the results of the second cycle of the 1st and 2nd meetings of the objective test.

Number	Name of Student	Meeting to	Value	Value of Cycle I	Minimum Completeness Criteria
1.	CA	1	65	65	70
		2	65		
2.	MN	1	65	67.5	
		2	70		

3.3.4. Cycle III

To find out the ability to add arithmetic using educational game media to count in cycle III, the following table shows the test results data collected through an objective test assessment, totaling 10 questions. **Table 5** describes the test results for adding up to 10 objects in cycle III. CA got a score of 70 and MN got a score of 75. The value obtained by each of these students has reached or exceeded the expected Minimum Completeness Criteria.

Table 5 explains that in cycle III the objective test scores obtained by CA and MN have reached or exceeded the Minimum Completeness Criteria and the scores obtained by MN are still greater than CA. Thus, this study achieved the expected results and objectives after going through three cycles.

Table 6 and diagram 1 describe changes in the assessment results of pre-cycle, cycle I, cycle II, and cycle III, as well as explain the increase in value from pre-cycle to cycle 1, from cycle I to cycle II, and from cycle II to cycle III.

Table 5. Data on the results of the third cycle of the 1st and 2nd meetings of the objective test.

Number	Name of Student	Meeting to	Value	Value of Cycle I	Minimum Completeness Criteria
1.	CA	1	70	70	70
		2	70		
2.	MN	1	75	75	
		2	75		

Table 6. The value of each cycle and the increase in its value.

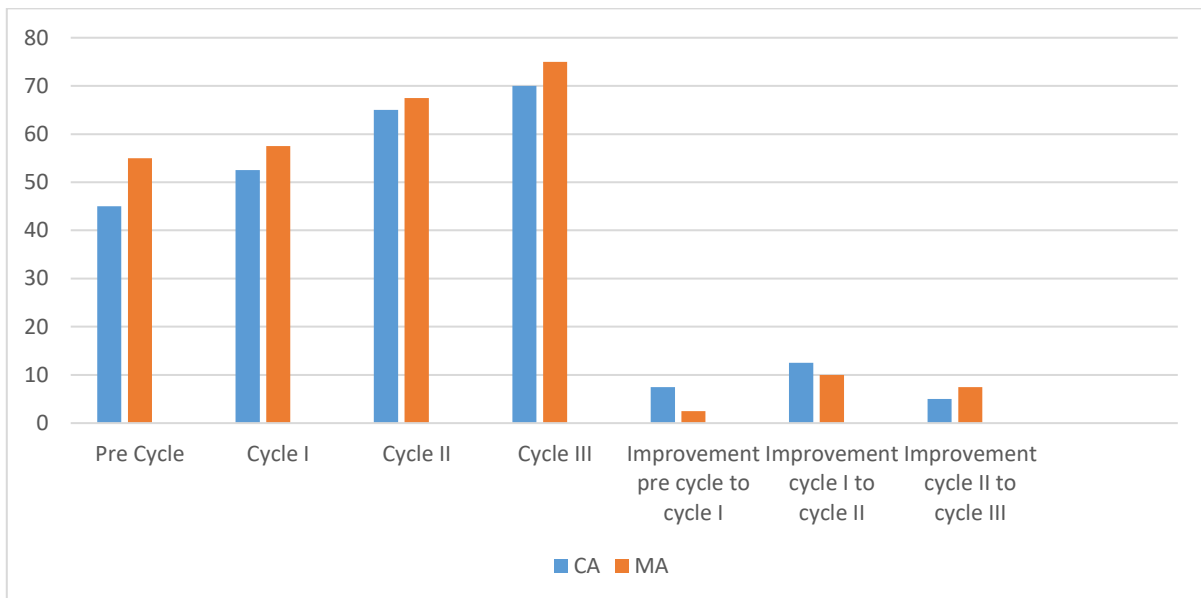| Name of student	Pre Cycle	Cycle I	Cycle II	Cycle III	Improvement of Pre Cycle to Cycle I	Improvement of Cycle I to Cycle II	Improvement of Cycle II to Cycle III
CA	45	52,5	65	70	7,5	12,5	5
MN	55	57,5	67,5	75	2,5	10	7,5

Figure 3. Obtaining the value of each cycle and increasing its value.

According to **Table 6** and **Figure 3**, it can be seen that there is an increase in the values obtained by CA and MN in each cycle, namely from pre-cycle to cycle I, from cycle I to cycle II, from cycle II to cycle III. From the pre-cycle to the second cycle there was an increase in the score but not yet met the Minimum Completeness Criteria. In cycle III, CA and MN obtained scores according to or more than the Minimum Completeness Criteria. Thus, we can see the contribution of the use of educational game media for numeracy to the achievement of learning outcomes about the ability to count addition in students with intellectual disabilities. It is proven that learning to count using game media is more interesting for children than using classical media using paper and stationery (Yunus et al., 2015).

3.4. Analysis of research activity results

According to **Table 2**, the data from the pre-cycle objective test results, students' scores have not reached the expected Minimum Completeness Criteria. Thus, learning to count addition will be continued by correcting some shortcomings and using educational game media for counting in cycle I.

According to **Table 3**, the data from the objective test results for the first and second meeting cycles, students' scores have increased but have not reached the expected Minimum Completeness Criteria. Thus, the addition of learning with numeracy educational game media will be resumed in the second cycle by correcting some shortcomings according to the observations in the first cycle.

According to **Table 4**, the data from the objective test results for the second cycle of the 1st and 2nd meetings, the student's score obtained an increase but still did not reach the expected Minimum Completeness Criteria. Thus, the addition of learning with numeracy educational game media will be resumed in the third cycle by correcting some shortcomings according to the observations in the second cycle.

According to **Table 5**, the data on the objective test results of cycle III, 1st and 2nd meetings, students' scores have reached or exceeded the expected Minimum Completeness Criteria. Thus, learning addition with numeracy educational game media can improve student learning outcomes about counting addition and help achieve a value that matches or exceeds the predetermined Minimum Completeness Criteria.

4. CONCLUSION

After going through 3 (three) cycles, the value obtained by students in working on the addition of counting questions has reached or exceeded the predetermined Minimum Completeness Criteria value. This is supported by the results of observations by the research team and improvement efforts at each meeting and each cycle. Improvement efforts both in terms of tests or performance indicators of the teachers and students studied. This research can run smoothly and obtain results in accordance with the desired goals. Thus, it can be concluded that "The use of numeracy educational game media can increase the ability to add arithmetic to with intellectual disability students".

5. ACKNOWLEDGMENT

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