Enhance Learning Independence and Self Ability of Exceptional Children Through Developing Learning Media VBA for Excel Games

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Abstract. The aim of this research is to enhance learning independence and self ability of exceptional children. The implementation of learning was assisted by the application of VBA for excel games in mathematical learning. The formulation of the problem in this research are whether 1) developing media assisted VBA for excel games can enhance learning independence and self ability of exceptional children? 2) using open ended approach? 3) Did exceptional children have a positive respons in this learning? The approach used in this research is ADDIE which consists of five stage. Population of this study was in group which amounted to 17 samples of exceptional children. The instruments of research are cognitive test and observation. Based on the results of the research, there was an increase in learning independence and self ability of exceptional children through VBA-assisted mathematical learning media for excel games. While the implementation of learning media applied in exceptional children was success. Children showed bravery, active, enthusiastic, responsive, and excited when the process of learning took place.

1. Introduction

Exceptional children or children with special needs are children who have low physical, mental and social behavior compared to the average number of children[1], before conducting research on the abilities of students with special needs more deeply, it is important to know the characteristics and characteristics of children with special needs in educational psychology which are the obstacles or they lie in perceptual disorders, brain damage, MBD (Minimal Brain Dysfunction), reading difficulties (dyslexia) and disorders of understanding words (developmental aphasia) [2]. Therefore, impacting the obstacles experienced by students in special needs also affects the mastery of mathematics, so more mature planning when delivering material needs to use media or teaching aids so students with special needs can understand the material [3–6].

The ability and independence of children for special needs that influence factors are 1) parents who involve parenting [7], social support, namely the community and family [8]. But the anticipation of a teacher facing a child student's special needs needs to be considered regarding parenting, besides that the teacher must be able to measure his personal attitudes to the education of children of special needs namely 1) a positive attitude, the attitude of teachers who receive inclusive education (children with special needs) all children have different characteristics and needs 2) negative attitudes, attitudes of teachers who reject inclusion education (children with special needs), teachers are less supportive both mentally and academically [9].
Teaching factors that influence the success of students' level of progress are special needs to improve students' independence and self-ability namely 1) Mastering basic skills in dealing with children with special needs; 2) Having the ability to carry out the teaching process; 3) Invite children with special needs to interact and participate in learning activities; 4) Give praise and appreciation for children with special needs; 5) Helping children with special needs to focus their attention; 6) Describe and explain; and 7) Helping children to achieve self-discipline [10]. From these factors on each point a consideration for an instructor makes learning strategies one of which is Open-Ended.

Open-Ended is an approach that has a function to unite student activities and mathematical learning material activities, namely material numbers, by giving students the opportunity for many different answers, and the answers they convey are correct. This can provide benefits to children of students special needs to vent themselves to give their own statements or opinions, so as to bring up learning independence and self-ability of students.

Teachers mostly experience difficulties when delivering material to students especially to students who have special needs. One way to overcome this is with the creative power of the instructor, so that learning is more effective, namely making interesting and interactive teaching aids or media for students of children who are specifically ICT-based needs. The advantage, making media is more economical, and more practical as a substitute for the number of props. The media is using VBA for Excel as a medium that helps visualize material numbers that are conveyed to students so that students understand them more through the instructor's way using an open-ended approach.

2. Method

The method of this research was the ADDIE method consisting of 5 stages [11,12], namely 1) Analysis of objectives, curriculum, material numbers, student difficulties, 2) Open ended strategy design, designing media algorithms using VBA for Excel, 3) Development, making learning media, validation from media experts and material experts. 4) Implementation, trials for students with special needs and observations of media users. 5) Evaluation, input from media expert validators, material experts and evaluation of media observations. Kriteria validation assessment from media experts and material experts can be seen in table 1 [13].

| Percentage | Validation Level | Interpretation         |
|------------|------------------|------------------------|
| 76 - 100   | Valid            | Worth / need not be revised |
| 50 - 75    | Valid Enough     | Fair enough / partial revision |
| 26 - 50    | Less Valid       | Less feasible / partial revision |
| < 26       | Invalid          | Not feasible / total revision |

Media VBA for Excel games through the rupiah have been tested, based on media experts' evaluation of 86.5%, meaning that they are feasible and do not need to go through the revision process, and the assessment of material experts by 80% means that the data is worth not going through the revision process.

The instrument used for the study was in the form of a test of students' cognitive abilities, processed statistically using a normality test and the Wilcoxon test and observation sheet of students with special needs to see the response to the media used.

3. Result and Discussion

3.1. Result

Before using learning media with games using VBA for Excel about material numbers through the rupiah currency, it was obtained observations from 17 students in one class of children with special needs regarding independence and self-ability of students can be seen in table 2.
Table 2. Observation Results Before Using Media

| Learning Independence | Number of active children | Percentage | Self Ability | Number of active children | Percentage |
|-----------------------|---------------------------|------------|--------------|---------------------------|------------|
| Not dependent on others | 5                         | 29.41%     | Able to overcome the problems faced | 3           | 17.65%     |
| Self confidence       | 3                         | 17.65%     | Convinced of his success               | 3           | 17.65%     |
| Discipline            | 0                         | 0%         | Dare to face challenges                | 2           | 11.76%     |
| Self initiative       | 1                         | 5.88%      | Dare to take risks                    | 17          | 100%       |
| Sense of responsibility| 1                         | 5.88%      | Able to interact with other people    | 9           | 52.94%     |
| Self Control          | 7                         | 41.17%     | Tough and not easy to give up          | 17          | 100%       |
| Average               |                           | 16.67%     | Average                                 | 50%         |

Table 2 explains that the learning independence of students with special needs is still low with an average based on the observed indicators of 16.67%, the low factor of student independence lies in disciplinary behavior of 0%, while the highest factor lies in self-control of 41.17%. And students' low self-ability is also seen from the average based on the observed indicators of 50%, the lowest factor of students' ability lies in facing challenges of 11.76% while the highest factor lies in students who dare to take risks and are not easy give up 100% even though the final results of students are still low overall.

For student results through written tests, namely looking at students' mathematical thinking skills can be seen from Table 3.

Table 3. Cognitive Score Before and After

| Student Code | Before | After |
|--------------|--------|-------|
| S-1          | 4      | 4     |
| S-2          | 3      | 4     |
| S-3          | 3      | 3     |
| S-4          | 0      | 2     |
| S-5          | 4      | 4     |
| S-6          | 2      | 3     |
| S-7          | 3      | 4     |
| S-8          | 3      | 4     |
| S-9          | 2      | 3     |
| S-10         | 3      | 4     |
| S-11         | 3      | 4     |
| S-12         | 3      | 4     |
| S-13         | 3      | 4     |
| S-14         | 4      | 4     |
| S-15         | 3      | 4     |
| S-16         | 3      | 4     |
| S-17         | 3      | 4     |
| Average      | 2.88   | 3.71  |

To make a decision whether there is a connection between before and after the use of VBA Game media for Excel, first use the nomination test in Table 4.
Table 4, shows the significant value of the Shapiro-Wilks normality test is 0.000 <0.05. Means that both data before and after using the media are not normal. Therefore, the two data were continued by using the Wilcoxon test to determine the influence between before and after media use.

**Table 5. Wilcoxon Test**

|                | After - Before |
|----------------|----------------|
| **Z**          | -3.500<sup>b</sup> |
| Asymp. Sig. (2-tailed) | .000 |

<sup>a</sup> Wilcoxon Signed Ranks Test  
<sup>b</sup> Based on negative ranks.

Table 5, shows that the significance of Wilcoxon with 2 parties is 0.000 <0.05, which means there is an influence of media VBA for Excel games through the rupiah currency before and after use. Table 6, shows that the class average after using the media is higher than before and the value of each student is equally high compared to before using the media.

**Table 6. Average Descriptions and Standard Deviations**

| Condition   | Average | Standard Deviation |
|-------------|---------|--------------------|
| Before      | 2.88    | 0.93               |
| After       | 3.71    | 0.59               |

From the results of students' cognitive abilities seen also the factors of student learning independence and self-learning abilities of students can be seen in table 7. Table 7, shows an increase in the average observation results of student learning independence to 72.55% and the students' self-ability on average the observations become 96.08%. Seeing from the results of observations that there needs to be a revision of some media that raises students to improve in behaving discipline, have self-initiative, and self-control on indicators of learning independence.

**Table 7. The Observation Results after Using Media**

| Learning Independence         | Number of active children | Percentage | Self Ability | Number of active children | Percentage |
|-------------------------------|---------------------------|------------|--------------|---------------------------|------------|
| Not dependent on others       | 14                        | 82.35%     | Able to overcome the problems faced | 15          | 88.23%     |
| Self confidence               | 13                        | 76.47%     | Convinced of his success             | 17          | 100%       |
| Discipline                    | 10                        | 58.82%     | Dare to face challenges              | 17          | 100%       |
| Self initiative               | 12                        | 70.59%     | Dare to take risks                   | 17          | 100%       |
| Sense of responsibility       | 14                        | 82.35%     | Able to interact with other people   | 15          | 88.23%     |
Learning Independence | Number of active children | Percentage | Self Ability | Number of active children | Percentage
--- | --- | --- | --- | --- | ---
Self Control | 11 | 64.71% | Tough and not easy to give up | 17 | 100%
Average | 72.55% | Average | 96.08%

3.2. Discussion

This study looked at the objective analysis of helping students with special needs in recognizing numbers by using ICT-based media, namely VBA for Excel software through the rupiah currency, based on the curriculum used by students with special needs, in addition, analyzing the difficulties of students working on questions about the rupiah.

![Figure 1. Cognitive Test of Students Before Using Media](image)

Figure 1 explains the students' mistakes in answering alternative substitutes for ten thousand, and students answer all currencies, as well as for other questions, this shows students have not been able to understand the content of each currency.

The strategy used by researchers is an open-ended approach, namely students are given a problem with the currency, where students will find and answer many alternatives from one currency, this is designed so that the students' self-reliance and ability are formed. After that, designing VBA for Excel media using a flowchart.
Figure 2. Media creation flowchart

Figure 2 explains the process of making a number media through the rupiah in the initial stage, students with special needs try to enter the currency value on the cell address in Microsoft Excel or what is called input, then students choose the nominal type of money in accordance with the input, if the result is correct, the face image will appear green or the game is finished and if the image is wrong then the red face image comes out, and students with special needs will try again.

After the design of making media, it is necessary to plan a questionnaire for media validation assessment conducted by media experts and material experts for the feasibility of the media that can be implemented for children with special needs while teaching and learning is taking place in the classroom.

Figure 3. Design of the Media Validation Process

Figure 3 describes the plan for the media feasibility process that can be implemented for students with special needs. First, the finished media needs to be assessed by the validator, namely media experts
and material experts based on the percentage criteria in the form of indicators for measuring the media, after that, collect the results of the evaluation criteria for the percentage of validators to be processed. If there is a deficiency, the media needs to be revised in total or partially revised, until the results of the validator provide a checkpoint the media. Media that has gone through a validation process is developed more interesting but must be adapted to the evaluation of the validation criteria as a consideration through the return process, so that the feasibility of the media has been tested and if it is still not feasible it needs to be revised again.

Table 8. Media Response from Media Experts and material Experts

| Response                | Input                                                                 |
|-------------------------|----------------------------------------------------------------------|
| Media Experts           | Add interesting images and associate with numbers, no need for a lot of text. Media must be focused on numbers related to currencies, no need to add other animated images that make children special needs not concentrate. There needs to be a limitation on the delivery of numbers in currencies to make it easier for children with special needs to interpret numbers. Create game elements in interesting media so that the open ended approach is truly implemented. |
| Material Experts        | The design made into a media that is formed and has been tested through the assessment process of media expert validators and material experts into media models and before the media for students with special needs needs consideration in the form of responses from media and material experts as well as input from 17 students with special needs as users so that the media development is better, for media responses from media and material experts can be seen from table 8. |

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![Figure 4. Currency Media VBA for Excel](image)

Figure 4 explains, the media is based on the evaluation of validator criteria and input from the response of media experts. Then the media is tried out by students of children with special needs and they are given the opportunity to explore and understand, after completion of learning students with special needs are asked for their responses. Of the 17 special needs students, all gave positive responses, namely they asked to learn to use the media again and they felt happy when trying media using VBA for Excel [14]. For the process of activities students with special needs use media with Open-Ended steps [15] can be described in table 9.

Table 9. Description of Learning Activities with Media
### Open-Ended
- Use of VBA Media for Excel
- Student Activities

| Student activities must be open | Students observe the way the media work, the teacher gives one question that is displayed on the media. | Each student has different answers and students and proves the answers to student statements. |
|------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| The number of mathematical answers is based on students' thinking processes. | Each student is given the opportunity to run the media from a statement. | Students start mechanics and record numbers through the rupiah. |
| Student activities and mathematical activities are one unit. | Students begin to explore and are familiar with the media to solve mathematical problems. | Students understand alternative answers from the form of a rupiah currency unit by looking for similarities from several rupiah currencies. |

The results obtained by students when given a test again of students, it seems that students have begun to focus on questions and provide the right answers. The results of these students can be seen in Figure 5. Figure 5, explains that students with special needs have given one correct answer to each question. Students can interpret questions and understand the content of numbers through the rupiah.

![Figure 5. Results of Student Answers After Using Media](image)

To evaluate the media, on the use of students there is a program error so that in the media section it does not run properly need to be improved and there is a need for media development that can be related to the next material. In accordance with the curriculum and able to motivate students to be more enthusiastic.
Figure 6. Language of the VBA program for Excel

Figure 6 describes the program language being checked if there is an error in writing the function and flow of the algorithm, besides, the need for additional commands to perform functions so that the media when run is more interesting and interactive [16,17].

4. Conclusion
Based on the results of the research and discussion it can be concluded that 1) the development of media using VBA for Excel can improve students' self-reliance and self-ability when before and after using the media. 2) Media can help when teaching and learning takes place using the Open-Ended approach. 3) Number material with the media gets a positive response so students with special needs. And there is a note in the development of media that the media must be related to the next material and motivate students with special needs to be more enthusiastic.

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