To grow a joyful learning in SLB through a manipulative teaching aid based on multi-function video

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Abstract. Students in SLB need to be given a joyful learning. The problems were: (1) How to identify the need for Manipulative Teaching Aids based on Multi-Function Video? (2) How was the analysis of the growth of Joyful Learning in SLB students through the application of Manipulative Teaching Aids based on Multi-Function Video? The goals: (1) To identify the need for Manipulative Teaching Aids based on Multi-Function Video. (2) To foster of Joyful Learning in SLB in mathematics learning through the application of Manipulative Teaching Aids based on Multi-Function Video. The research method is a qualitative approach. Main Activities: (1) Identifying the need for manipulative teaching aids for SLB students (2) analyzing how to grow a Joyful Learning in SLB in mathematics learning, (3) implementing Manipulative Teaching Aids based on Multi-Function Video to support the growth of Joyful Learning in SLB in mathematics learning. (4) conducting interviews with research subjects; data analysis; and triangulation. The results: (1) Identified needs of Manipulative Teaching Aids based on Multi-Function Video for SLB. (2) Joyful Learning grows in SLB through the application of Manipulative Teaching Aids based on Multi-Function Video.

1. Introduction
Students in Extra-Ordinary School (ES) must empower themselves of their potential reason. In Indonesia, Extra-Ordinary School (ES) is known as SLB. ES teachers must be able to be innovators in teaching with a pleasant atmosphere for children with special needs. Research with applied product research schemes is expected to make an original contribution, namely science and technology products to find and implement Video Manipulative Prototype Teaching Aids based on Multi-Function to supporting the growth of Joyful Learning in ES, which is simplified.

Hopefully, by implementing the Manipulative Teaching Aids based on Multi-Function Video, the learning atmosphere in ES will be interesting and fun. If learning in ES is interesting and fun, it is expected that the ability of ES students in mathematics will increase. Written by [1] that if the ability of mathematics and other lessons can improve, this will make ES students accustomed to facing a problem. Facing something complex in life, requires good thinking skills. ES students who are able to think well are expected to be able to compete in the global world.

The problems to be resolved are as follows. (1) How to identify the need for Manipulative Teaching Aids based on Multi-Function Video? (2) How was the analysis of the growth of Joyful Learning in ES students through the application of Manipulative Teaching Aids based on Multi-Function Video?

The purposes is as follows. (1) To identify the need for Manipulative Teaching Aids based on Multi-Function Video. (2) To foster the Joyful Learning in ES in mathematics learning through the application of Manipulative Teaching Aids based on Multi-Function Video. The study in the literature review on
Manipulative Teaching Aids in ES, Multi-Function Video Manipulative Teaching Aids, and the growth of Joyful Learning are the state of art of this applied research.

Use of Manipulative Teaching Aids in ES. ES is a school specifically intended for Children with Disabilities (CwD). Although it must be slowly in accordance with the level of disability of students, but government efforts to improve the quality of learning in ES need to be supported. Written by [2] that thinking skills are the ability to think and reason in answering complicated questions and/or solving a case or problem. ES teachers need to have the responsibility to train their students with thinking exercises, even with the help of the use of teaching aids. Because, only with the ability to think this can later be used by ES students to live their lives after completing education. Low-level thinking is only useful for answering simple test questions or exam questions that may not necessarily be used in real life after graduating from ES. Written by [3] and [4] that the use of various media such as the use of manipulative teaching aids is very important to enhance student absorption. According to [5], Manipulative Teaching Aids are teaching aids that can be used for various purposes because their shapes can be changed or manipulated. Examples of Manipulative Teaching Aids are Multi-Function Video. This teaching aid can be used for the blind, the deaf, and the mentally disabled.

Multi-Function Video Teaching Aids. The ICT for manufacturing of Multi-Function Video teaching aids can be used. Multi-Function Video can be used to visualize the child's own body such as fingers and toes, clothing, as well as colorful tableware and various sizes, blocks, even plants, various animals and filled with sound or Sign Language. Now there are many basic mathematics learning CDs/ VCDs that are packaged attractively and are sold freely in the market. Just how to as an educator choose according to the needs and friendly for ES children so that learning becomes interesting and fun. According to [5], through the Multi-Function Video teaching aids, teachers can arrange questions or explain so that the material can be absorbed by students.

Joyful Learning Activities. Written by [6] that learning that makes the learning environment useful and enjoyable for students, both with manipulative teaching aids approaches and teaching aids that are oriented and contextualized with student reasoning will improve student thinking better. Whereas [7], stated that teachers and students need to be equipped with knowledge that must be in accordance with the latest needs. If what is faced is CwD in ES, learning that trains students to grow Joyful Learning needs to be mastered by the teacher.

Related to Joyful Learning, [8] wrote that Joy, according to the Oxford English Dictionary, is described as an emotion or feeling of pleasure. The adjective joy is fun which also describes a kind of feeling, expresses and causes pleasure. This means, the process of learning mathematics for CwD that utilizes teaching aids occurs "in a pleasant atmosphere and mathematics becomes easy". The learning process or learning experience can make ES students or in inclusive schools feel happy. Written by [9], also that a pleasant learning perception turned out to have a positive influence on student motivation. Furthermore, according to [10] and [11], indicators or characteristics of the growth of Joyful Learning are as follows. (1) Students are willing to learn. (2) Students look enthusiastic about following the learning process. (3) Students seem happy to follow the learning process. (4) Students appear to dare to ask questions and think during the learning process. (5) Students appear to be active in following the learning process.

2. Methods

2.1. Research Approaches, Subjects, and Locations

This research uses a research method with a qualitative approach. Research Subjects: Taken 5 students with visual impairment and visual impairment in ESof Salatiga who during the implementation of this applied product research, were appointed by ESof Salatiga to take part in learning by implementing a prototype of the Multi-Function Video-based Manipulative Teaching Aids to support the growth of Joyful Learning in ES in mathematics.

Research Locations: This research was carried out at ES of Salatiga and at the Mathematics Department, Faculty of Mathematics and Natural Sciences, Semarang State University.
2.2. The activities of this research are as follows:
The research activities that have been carried out are as follows. (1) Identifying the need for manipulative teaching aids for ES students in accordance with the demands of the 2013 curriculum. (2) Analyzing the fundamental thinking on how to foster Joyful Learning in ES in mathematics. (3) Making Prototypes of Manipulative Teaching Aids based on Multi-Function Video. (4) The application of Manipulative Teaching Aids based on Multi-Function Video as a support for the growth of Joyful Learning in ES in mathematics learning. (5) Providing exercises of mathematical problems whose resolution requires a Manipulative Teaching Aids based on Multi-Function Video. (6) Providing tests of mathematical problems whose completion requires a Manipulative Teaching Aids based on Multi-Function Video. (7) Analyze in depth the growth of Joyful Learning in ES students through the implementation of manipulative teaching aids based on Multi-Function VideoES students, who are the subject of research through: examining/evaluating student work; intensive interviews with research subjects; data analysis; triangulation (8) Compiling articles for international publications.

2.3. Data Analysis and Interpretation Techniques
Analysis / study of data in this study is based on Miles & Huberman's theory. Written by [12], suggested that data analysis includes: data reduction, data presentation, data interpretation, and drawing conclusions and verification.

2.4. Indicators of Achievement of Joyful Learning Growth for ES Students
Indicators of the achievement of the growth of Joyful Learning in the learning process of students in ES are based on the opinion of [10] and [11] indicators of the growth of joyful learning in ES students are as follows. The results of the analysis of the growth of Joyful Learning on ES students through the application of manipulative teaching aids based on Multi Function Video, are recapitulated in 5 categories, namely: growing very well, growing well, growing medium, not growing enough, and very lacking in growth. The guideline table is recapitulated as in the following Table 1.

| No. | Growth Category of Joyful Learning for ES Students through the application of Manipulative Teaching Aids based on Multi-Function Video | The analysis shows that ES students have been able to carry out a series of interesting and fun learning activities (joyful learning). |
|-----|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Very Good Growth                                                  | Students follow the learning process that shows the 5 characteristics of joyful learning.                                     |
| 2.  | Grow well                                                         | Students follow the learning process that shows 4 characteristics of joyful learning.                                       |
| 3.  | Medium Growth                                                     | Students follow the learning process that shows 3 characteristics of joyful learning.                                       |
| 4.  | Underdeveloped                                                    | Students follow the learning process that shows 2 characteristics of joyful learning.                                       |
| 5.  | Very Less Growth                                                  | Students follow the learning process that shows 1 characteristic of joyful learning.                                       |

3. Results and Discussions

3.1. Research result

3.1.1. The first result. Identified the need for Manipulative Teaching Aids based on Multi-Function Video to support the growth of Joyful Learning in ES. The teacher feels the need for Multi-Function
Video teaching aids. Teachers need to be trained to be able to make and utilize the use of this Multi-Function Video teaching aid. Identification of the teaching aids that needed include: Integer operating aids, fractional operating aids, and geometry visual aids.

3.1.2. The second result. Joyful Learning growth occurs in ES students through the adoption of prototype manipulative teaching aids based on Multi-Function Video.

3.2. Discussion

3.2.1. Discussion for the First Result. The ability of teachers to make Multi-Function Video teaching aids that contain elements of thinking skills is an absolute must have. Written by [13] that teachers who are skilled in making questions and skilled in making teaching aids, and able to prepare appropriate teaching aids will be able to deliver their students to be able to solve problems in their lives after they finish their education in ES. In the 2013 curriculum it was written that the use of Learning Media was very important. Learning media can be manipulative teaching aids that have 5 characteristics, namely: (1) teaching aids that can be used individually or in groups. (2) The use of teaching aids can be changed or modified according to their purpose. (3) Can be applied to be linked to various different information. (4) Can be used to solve problems. (5) Can clarify the holding of a particular concept or formula.

Mathematics is often called a difficult subject, especially for children with disabilities. Therefore, researchers or lecturers need to conduct applied research on how to foster joyful learning in mathematical thinking for ES students through the implementation of Manipulative Teaching Aids in the form of Teaching Aids Multi-Function Video for students in ES.

Furthermore, the growth of Joyful Learning in mathematical thinking for ES students needs to be analyzed in terms of its growth rate. The emergence of Joyful Learning can motivate students to be creative. Creativity for ES graduates is needed in the future, including the demand for labor. For this interest in ES students' mathematical thinking, manipulative teaching aids are needed to provoke students' creativity.

In order to develop themselves ES children, now many found various educational services both formal and non-formal. In the cognitive development of ES children, it is necessary to be equipped with an understanding of basic mathematics such as shapes, sizes, patterns, problem solving, numbers, and counting. Mastering basic math skills is very important because it is found in the real life of children. Examples of Manipulative Teaching Aids based on Multi-Function Video as a support for the growth of Joyful Learning in ES that are produced and practiced are as follows. The following is an example of one of the Manipulative teaching aids based on Multi-Function Video products as a support for the growth of Joyful Learning in ES which is expected to be a model for visual-Auditive multi-functional mathematical teaching aids based on Joyful Learning (learning that seems easy and fun). Look at figure 1, below:

![Figure 1. Multi-Function Video for Number Operations](image)
What is meant by multi-function, means that Visual-Auditive teaching aids can be used as a medium to explain material to blind students, mentally disabled students, even deaf-speech. The Manipulative Teaching Aids Model based on Multi-Function Video is a visual aid that can be seen, touched, manipulated, or can be animated in the form of video, PPT, or can be voted on so that the teaching aid becomes more useful and makes learning fun (Joyful Learning) for the student. The use of Information Communication and Technology (ICT) is very possible, especially in the current disruption era 4.0.

3.2.2. Discussion for the Second Result. The second research result is the efforts of researchers to foster Joyful Learning in ES students through the adoption of prototype manipulative teaching aids based on Multi-Function Video through mathematics subjects. These results are based on an analysis of the FGD activities that have been carried out. The FGD or Focus Group Discussion was attended by a team of researchers who were also members of the Mathematics and Natural Sciences Learning Study Center for ABK (PKPM ABK) FMIPA UNNES, ES teachers, students interested in learning at ES, and a number of Mathematics Education Study Program lecturers who were interested in education at ES.

Thus, the growth of joyful learning as mentioned above is used by researchers in determining the degree of growth of joyful learning. In fact, [14] and [15] also stated that joyful learning is influenced by teacher attitudes, classroom conditions, subject matter, and available learning infrastructure and facilities.

Simple Patent (HKI). Additional simple patents (HKI) have been produced from the prototype of the Manipulative Teaching Aid as a support for the growth of Joyful Learning in ES. Record of Creation related to the Mathematics Teaching Aids produced: (1) Simple patents (HKI), No. 000140304 April 7, 2019. (2) Simple patents (HKI), No. 000161354 October 24, 2019.

4. Conclusions
The conclusions are as follows. (1) The need for Manipulative Teaching Aids based on Multi-Function Video is identified. (2) Joyful Learning growth occurs in ES students through the adoption of a prototype manipulative teaching aid based on Multi-Function Video. (3) Additional research results obtained in the form of a simple patent (HKI) from the prototype of the Manipulative Teaching Aids as a supporter of the growth of Joyful Learning in ES.

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