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## DEVELOPING MATHEMATIC LEARNING MEDIA USING MACROMEDIA FLASH 8 FOR FIFTH GRADERS OLEH

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### ABSTRACT:

This research confers an analysis of (1) the development of interactive media for mathematic learning in elementary schools and (2) the effectiveness of the interactive learning media developed using Macromedia Flash 8. The research method was research and development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model development stage. The data collection technique was validation questionnaires to be responded to by material and media design experts and students' responses. The media developed was tested on 12 fifth graders at SDN 3 Suwawa Tengah. These interactive media developed using Macromedia Flash 8 for fifth graders were scored 95% by the material expert and as such, were categorized as 'very reliable' and 96.25% by the media design expert, and hence, were also categorized as 'very reliable'. According to students' responses, the media were scored 96.2% and that being so, were considered 'very reliable' as well. After using the interactive learning media developed, students came with a mean score of learning outcome of 85%.

### INTRODUCTION:

Elementary schools constitute the early educational level in which students acquire basic concepts, which later will guide them to the next level. Teachers should be able to engender a creative innovative learning process which motivates students to develop learning materials or media. One of the learning subjects delivered at schools is mathematics, where good conceptualization is important. In correspondence with students' conceptualization, mathematic learning should be stylized to their growth and development and embrace students' cognitive, affective, and psychomotor aspects.

Some mathematic learning concepts at elementary schools are:

- Basic conceptualization is a new mathematic conceptualization, which comes about when students have never learned a certain concept. This basic conceptualization learning should act as a bridge which links students' concrete cognitive skills to abstract mathematic concepts to which students are still new.
- Conceptual understanding is the advanced level of basic conceptualization. This is aimed to enable students to understand a mathematic concept.
- Skill development constitutes advanced learning after basic conceptualization and

conceptual understanding. This skill development learning is aimed to improve students' skills in implementing different mathematic concepts (Suhendri and Rahmawati, 2016:186).

Mathematics is the subject which facilitates students to sharpen their logic. Mathematics, by its very nature, introduces students to concepts, skills, and thinking strategies essential for daily life. Additionally, it creates students' mindsets and increases their creativity. Therefore, mathematic conceptualization matters as it promotes students' skills, mindset, and creativity. However, elementary schools are still using textbooks as learning sources while creativity and innovations are two necessary aspects of learning.

Mathematics teaching is the process or activity carried out by mathematic teachers who, in the process or activity, teach mathematics to students. Mathematics teaching contains teachers' efforts to generate an appropriate learning climate and services responding to students' diverse skills, potentials, interests, and needs. Teachers' efforts are noteworthy to be underlined as they will help teachers imbed an optimal interaction between teachers and students or between students to other students in mathematic learning (Wandini and Banurea, 2019:5).

In this technology and information revolution era, also with these pandemic issues, learning processes must face numerous challenges. Learning processes, which were offline (at schools), now have to be online. This phenomenon calls for innovations and creativity in learning processes. When learning, especially the mathematic one, anchors only on textbooks, it will be poorly implemented because mathematic learning demands thorough conceptualization. Thus, media used should be considered. According to Piaget's intellectual development level of students,

elementary school students, who are aged 6-11 years old by average, are at the concrete operational stage (Bujuri, 2018). Accordingly, the media selected should be adjusted to students' development.

The results show that in the mathematics subject, especially in the scale material, students acquired a low learning outcome, which was 41.6%. The low score is the result of mathematic conceptualization using conventional media (textbooks) which bore students when they are supposedly learning. Meanwhile, interactive learning media are never used to deliver the scale material. In addition, during the pandemic, mathematics learning is online, and the learning process only encompasses assignments and monotonous activities, e.g., solving problems from textbooks (thematic books). This makes mathematics unattractive and bores students as they have to only solve problems conferred by teachers. As a result, students are demotivated to learn.

Most students assume that mathematics is tedious and difficult. That assumption comes from the fact that mathematics comes with various forms of practices and formulas students must comprehend and memorize. Accordingly, in teaching mathematics, teachers must apply an attractive learning system which impels students to learn mathematics. Resolutions to poor mathematics learning are of import to augment the quality of mathematics learning.

Interactive media are envisaged effective for inducing students to participate in the learning process optimally. By using interactive learning media, students' physical and psychological engagement may motivate them and solidify their senses to learn, and as such, create significant learning. As regards learning media development, we have many applications to produce interactive learning media. Among the applications are Microsoft

PowerPoint, Adobe Flash, Macromedia Flash 8, Articulate Story Line, Geogebra, and others. Interactive learning media facilitate slow learners to learn in that they deliver an effective climate and hence averting students from boredom and making them stay focused.

That being so, developing interactive media using Macromedia Flash 8 is of paramount importance to attain a fun learning process for students. Macromedia Flash 8 can be exerted as mathematics interactive media to showcase or visualize concepts as tools to construct mathematic concepts.

### **RESEARCH METHODS:**

This research was performed at SDN 3 Suwawa Tengah Jalan Pasar Tulabolo Tolomato Suwawa Bone Bolango Gorontalo Province. This research was undertaken on 12 fifth graders in the odd semester of the academic year of 2021/2022. The method was research and development. Research and development was a research method applied to result or develop a certain product and to test its effectiveness (Sugiono, 2018:407).

The approach used was the ADDIE development model. The model is made up of analysis, design, development, implementation, and evaluation (Islam and Fahmi, 2018:625).

### **RESULTS AND DISCUSSION:**

#### **RESULTS OF MEDIA DEVELOPMENT:**

To begin this research, we carried out a preliminary study or need analysis. The two activities had been adapted to our research timeline. They were aimed to collect information and descriptions of mathematics learning which involved the learning media available at SDN 3 Suwawa Tengah for fifth graders. The results of this research had been tailored with the ADDIE development model. The model, which we had adopted and modified, was composed of the stages of

Analysis, Design, Development, Implementation, and Evaluation.

And yet, in this media development stage, we implemented three stages, i.e., Analysis, Design, and Development to yield interactive and attractive media which were then validated by experts, both material and media design ones.

#### **1. ANALYSIS:**

In this stage, we made a preliminary analysis of the mathematic learning process for fifth graders at SDN 3 Suwawa Tengah. This analysis was aimed to amass information and descriptions of the mathematic learning process, students' characteristics, and facilities provided by the school.

Thus, this stage was the beginning or fundamental stage in the media development process. The analysis was made to collect information on the needs to be catered to (Apriliani, Maksum, Wardhani et al., 2021:134). In this research, the analyses made were analyses of students, curriculum, and learning objectives. All analyses were the basis to design interactive learning media.

#### **2. DESIGN:**

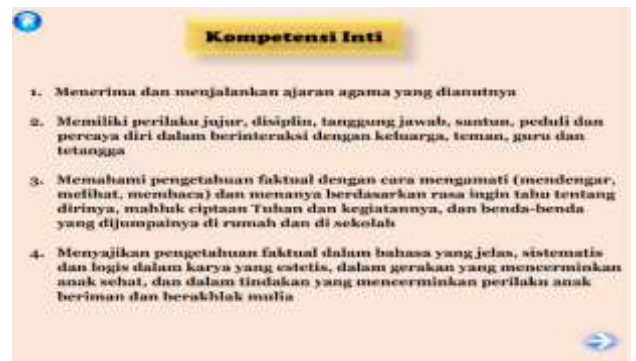
The following stage was design, aimed to make the development research design. In this stage, we designed and made the product based on what was formulated in the previous stage. The interactive media were selected, considering that they coalesced two or more elements composed of pictures, charts, images, audios, animation, and videos in an integrated way and built a two-way communication. The interactive learning media for the scale material produced using Macromedia Flash 8 at SDN 3 Suwawa Tengah were developed by combining texts, pictures, animation, and videos.

The media design was customized to students' characteristics. Additionally, text

types, colors, and picture layout were determined in such a way to attract students and made them stay focused. The materials contained in the interactive learning media were tailored to the thematic book and learning objectives based on the 2013 Curriculum.

**3. DEVELOPMENT:**

In the development stage, the interactive media product was made. Validation was also carried out by learning material and media design experts. The material expert afforded 95%, categorizing the product as “very reliable”. Similarly, based on the media design expert’s validation, the product was also “very reliable” (96.25%). The validated media revised are as follows:



Kompetensi Dasar	Indikator Penguasaan Kompetensi
3.4 Menjelaskan Skala Melalui Denah	3.4.1 Mengidentifikasi skala melalui denah 3.4.2 Menjelaskan skala melalui denah 3.4.3 Membandingkan hubungan skala dan jarak
4.4 Menyelesaikan Masalah yang berkaitan dengan skala pada denah	4.4.1 Menyelesaikan masalah berkaitan dengan skala pada peta atau denah 4.4.2 Menyelesaikan permasalahan masalah yang berkaitan dengan skala pada denah



This is the first page of the interactive media developed. Students should press the menu button “Ayo belajar” to go to the next page.



On this page, there are several buttons which students can press. They are “KI & KD”, “Tujuan Pembelajaran”, “Materi”, “Kuis”, “Evaluasi”, and “Sertifikat”.

The “Kompetensi Inti” page contains information with regard to basic competencies and competency accomplishment indicators which should be achieved by students in the learning process.

The material contained by the media was the scale material for the fifth grade. The

material comprised readings, images, formulations, and some exercises.



A quiz was designed to deliver the stimuli from the learning process of the scale material to the fifth graders.

The "Evaluasi" page contains a multiple-choice test with several questions in relation to the scale material for the fifth grade.



On this menu is demonstrated the certificate of completion for students who have completed the learning process from the media.

### EFFECTIVENESS OF INTERACTIVE LEARNING MEDIA:

These stages were aimed to study the effectiveness of the developed interactive learning media. These implementation and evaluation stages were part of the ADDIE model.

#### 1. IMPLEMENTATION:

After the product was made by referring to the ADDIE model and validated by both media and material experts, we proceeded to the next stage, i.e., implementing it to the research subjects, namely 12 students at SDN 3 Suwawa Tengah. After the implementation, students were given questionnaires to assess the media used in the learning process. Table 4.1 demonstrates the recapitulation of the mean scores based on students' responses.



**Table 4.1 Recapitulation of the Students' Assessment**

No.	Aspect Assessed	Respondents' Score												$\sum x$	$\sum xi$	P (%)	Degree of Validity	Desc.
		1	2	3	4	5	6	7	8	9	10	11	12					
1	The application could be easily installed.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
2	The application was equipped with comprehensive installation guidance.	4	5	4	5	5	5	4	4	5	5	5	5	56	60	93%	Valid	No revision needed
3	Media operating was equipped with comprehensive guidance.	4	4	4	4	4	4	4	4	4	4	5	5	48	60	83%	Valid	No revision needed
4	The media neither took a long loading time nor suddenly stopped.	4	5	4	4	4	5	5	5	5	5	5	5	56	60	93%	Valid	No revision needed
5	The computer/laptop neither took a long loading time nor suddenly stopped when the media were accessed.	5	4	4	4	4	5	5	5	5	5	5	5	56	60	93%	Valid	No revision needed
6	The pictures displayed were attractive.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
7	The materials presented in the media were understandable.	4	5	4	5	5	5	4	4	5	5	5	5	56	60	93%	Valid	No revision needed
8	The language used was understandable.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
9	The media appearance was attractive.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
10	The media spurred students to learn.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
11	The exercises were clearly narrated.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
12	The exercises were in conforming with the materials delivered.	4	5	4	5	5	5	4	4	5	5	5	5	56	60	93%	Valid	No revision needed
13	All buttons functioned well.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
14	The audio supported the material delivery.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
15	The writing styles were clear.	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100%	Valid	No revision needed
16	Feedbacks were available when the exercises were done.	4	5	4	5	5	5	4	4	5	5	5	5	56	60	93%	Valid	No revision needed
Total													924	960	96.2%	Valid	No revision needed	

Based on Table 4.1, based on 12 fifth graders' assessment, the interactive learning media developed using Macromedia Flash 8 at SDN 3 Suwawa Tengah acquired a score of 96.3%, showing that the media were valid and no revision was needed.

## 2. EVALUATION:

In this stage, I evaluated the pilot test of the mathematic learning media product. When using the learning media, students were showcasing enthusiasm, interests, and active engagement in the learning process. In addition, they also vested positive responses, attested to by their questionnaire responses. The teacher stated that the interactive media were helpful as they assisted him/her to visualize the scale material. Overall, I found no serious challenges when the media were in use. As such, there was no end product revision as the media developed had been reliable to use at schools. The interactive learning media were tested on 12 fifth graders at SDN 3 Suwawa Tengah. The t-test was conducted to analyze the difference in mean scores students acquired before and after treatment. The interactive learning media developed contained ten multiple-choice question items as the exercises.

Table 4.7 exhibited the result of the media pilot tested on the fifth graders at SDN 3 Suwawa Tengah.

Table 4.7 Students' Pretest and Posttest Results

No.	Name	Pretest Score (X1)	Posttest Score (X2)
1	Arifin Jidan Sabilah Ente	55	80
2	Ibrahim Tobuto	50	82
3	Moh. Andika Putra Due	35	85
4	Moh. Rehan Ente	55	80
5	Moh. Rehan Suga	50	80
6	Mohamad Riski Mokdagow	50	85
7	Naufal Azmi Dafa Ente	55	85
8	Raditya Lapananda	55	85
9	Gladies Raqwan Azizah Hasan	55	87
10	Risnayanti R. Djafar	55	87
11	Siti Nur Anisa Tahaku	50	90
12	Siti Nur Vadila Eka Putri Tobuto	50	90

Predicated on Table 4.7, I executed a quantification to examine whether the media could enhance students' cognitive apprehension. Table 4.8 indicates the result of pretest and posttest-based assessment using the t-test with SPSS.

Table 4.8 One-Sample Statistics and One-Sample Test

	N	Mean	Std. Deviation	Std. Error Mean
Pre-Test	12	51.2500	5.69090	1.64282
Post-Test	12	84.6667	3.57601	1.03231

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pre-test	31.196	11	.000	51.2500	47.6342	54.8658
Post-test	82.017	11	.000	84.6667	82.3946	86.9388

Table 4.8 manifests that 12 respondents had both pretest and posttest scores. The deviation freedom was 11, the Sig. (2-tailed) was 0.000, and the confidence interval was 95%. Moreover, students' pretest and posttest mean scores were 51.25 and 84.66, respectively. The lower and highest pretest scores were 35 and 55, respectively, whereas the lower and highest posttest scores were 80 and 90, respectively.

## CLOSING CONCLUSION:

Based on the results and discussion, several conclusions were drawn as follows:

1. The interactive learning media developed using Macromedia Flash 8 was reliable to use in the mathematic subject of the scale materials. The reliability was proven by learning material and media design experts. According to the learning material and media design experts, the product developed acquired 95% and 96.25%,

respectively, and hence, was categorized as "very reliable".

2. The media developed was effective for escalating fifth graders' learning outcomes at SDN 3 Suwawa Tengah. The effectiveness was pointed out by students' learning outcomes in the mathematic subject using the interactive learning media developed using Macromedia Flash 8. They successfully achieved a mean completion score of 85%. Besides, students' responses acquired 96.25% or very good criteria.

#### SUGGESTION:

1. There should be training for teachers to improve skills and creativity and use technology to make various learning media which support learning activities.
2. Because these media come with limitations, teachers, when using them, should use other relevant learning sources and must not use them as the only learning source.
3. As educators, teachers should be innovative and creative to optimize the learning process.

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