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Toondoo Application Based on Contextual Approach: Development of Comic Learning Media

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Abstract. This research aims to develop a comic learning media in the form of ToonDoo Applications in the subject of the circular motion. This research uses research and development methods by using a model from Borg & Gall that is adapted by Sugiono. The data of this study were obtained from the results of questionnaire responses of students and educators, validation questionnaires for material experts, media experts, and linguists. The type of data produced is qualitative data which is analyzed with criteria for assessment categories to determine product quality. The feasibility of comic physics books using the Toondoo application is based on a contextual approach according to experts in the "very feasible" category with an average score of 94.19% material experts, 89.46% media experts, 93% and 83.33%. To use comic book physics using the Toondoo application based on a contextual approach according to students and educators in the "very interesting" category with an average score of 85.61% in small group trials, 86.01% field trials and educator experience testing 88, 59%.

1. Introduction

The development of Science and Technology has contributed a lot in various aspects of life, one of which is progress in the field of education. The development of science and technology in the world of education has been widely used in the learning process [1-3].

Learning is a process of interaction that occurs between students and educators in a learning environment and involves learning resources [4]. Learning aims to make students gain knowledge and have a good attitude. In order to be implemented effectively and efficiently, the learning process needs to be planned properly.

Learning tools or media greatly support the teaching and learning process. Media can help clarify the material presented by educators to students[5]. The use of media in learning activities can help students to interpret difficult and complicated subject matter effectively and efficiently [6]. The use of media in learning will also provide an attraction to the material presented so that it can increase students' interest in learning the material.

Learning physics that is developing today, educators are less creative in the delivery of communication. This causes a difficult view of physics subjects and causes interest in learning physics to be low [7]. Educators only rely on textbooks as a guide in teaching. Plus the appearance of the physics textbook used is monotonous which contains long writing and formulas so that students are less interested in reading it. Most students prefer to read comics because they present many pictures of both anime and animal characters, so students do not feel bored when reading them [8].



The subject of physics in high school often contains physics concepts that are difficult to understand. High understanding and imagination are needed to be able to understand these physics concepts [9]. In addition, physics lessons are also considered as one subject that is difficult to learn because it consists of a complex set of formulas. This is compounded by the presentation of monotonous physics books that make students less interested in reading them [10]. The ages of children and adolescents prefer to read picture books like comics rather than reading textbooks that have a less attractive appearance. Comic books are more interesting to read because they contain pictures and have interesting stories [11].

Based on the results of preliminary research conducted in class X, SMA Negeri 17 Bandar Lampung, it was found that physics educators did not make use of the use of media in the learning process. This situation is evidenced by the use of media by educators in physics learning dominated by textbooks. The lack of learning media that is used causes the concept of physics to not be conveyed well and becomes difficult to understand, thus making students less interested in learning physics. Based on the questionnaire analysis the needs of students prefer learning media that are interesting, practical, and can clearly describe the concept of physics.

While the results of preliminary research at the Taman Betung Students High School and in Al Huda Jatiagung High School in South Lampung Regency, obtained results that the facilities and infrastructure provided by the school that could be utilized in the learning process were good and the use of learning media in the two schools had varied, but in practice it is not optimal, students are still focused on educators. This is because educators in the delivery of material do not use the available facilities as learning media. So that it can be concluded that the problems that exist in both schools are the same, namely the lack of creativity of educators in using learning media and the learning approach applied by educators is not optimal.

An integrated and earnest effort is needed to make physics an interesting and enjoyable lesson for students. One of them is by using the right learning media with the needs and desires of students. So it is necessary to develop innovative and interesting learning media so that it becomes an alternative choice of media that can be used by students and educators.

Alternative media can add to the attractiveness of students in understanding physics material and can package physics learning to be more interesting and fun for students. is a comic learning media [12].

Comics are illustrated stories that have funny meanings. It usually in the form of narrative and there is a particular page in the newspaper. Based on the description above, it can be concluded that the comic was illustrated stories that have a plot and has a special attraction for readers [13]. Reading comics may allow the reader to be truly absorbed in his reading and his imagination can be carried away even against his will. The power of comics depends on the fact that they are entertaining, and their characters are heroes and heroes that we may easily identify. In addition, the power of words and images creates a non-conventional atmosphere that helps readers read endlessly [14].

According to its function, comics are distinguished from commercial comics and educational comics. Commercial comics are far more needed in the market because they are personal, provide crude humor, are packed with conversation languages and market languages, have a simplicity of soul and morals and there is a universal human tendency towards hero worship. Whereas educational comics tend to provide informational content [15].

Educational comics are a form of cartoons in which characters present an educational story in a series of closely related images designed to entertain and educate readers. This visual media is specifically designed to broaden students' knowledge and encourage engagement outside the boundaries of the classroom [16].

Descriptions of interesting comic stories can add to students' interest in learning physics through comic learning media, and interesting comic views, unlike existing textbooks, make students interested in understanding physics.

One of the most developed comic media physics comic online Toondoo. Toondoo is an application that can offer teachers diverse prospects to advance students' learning appropriate to their inclinations. Moreover, this may be used as a venue for students to be socially aware, proactive, collaborative and involved in public and environmental affairs [17]. The application Toondoo can be used to design and distribute interesting digital comics online so that it can be used in making physics comic learning media.

The application Toondoo can be used by educators in the learning process, including to deliver material, to present the concept of physics visually, and to create a more interesting and enjoyable learning atmosphere.

Research related to the development of comics as learning media was carried out by Farida Huriawati and Retno Tiyas. Farida Huriawati with Perwandari and Intan Permatasari developed physics comic books on the subject of Newton-based constructivism. It was found through this study that comics developed were able to increase students' learning motivation [18]. While Retno Tiyas's research was conducted with Marmi Sudarmi, and Diane Noviandini, namely developing physics comics as learning media on the topic of camera working principles. From the results of the study, it was found that comics as a medium of physics learning were effective in motivating students in learning. Comics also have a positive influence in the form of courage to express opinions and interactions in learning, while in terms of cognitive comics can help understand the concept of the principle of working the camera [9].

The relevance of the Toondoo comic development can also be seen in the research conducted by Puspita Dwi Widyastuti, Rasiman and Rina Dwi Setyowati, namely the development of Toondoo online comic-based learning media with discussion and question and answer methods for basic geometry material for class X students. with Puspita Dwi Widyastuti's research lies in the similarity of the Toondoo application developed. The results showed that the Toondoo comic was effectively used as a learning medium.

The advantage of Toondoo Online Physics comics learning media compared to other comics is that comics are composed of various kinds of characters, backgrounds, and interesting objects that can be used easily, Toondoo also allows to draw the desired characters themselves. Comic stories use everyday language, so students can quickly understand the contents of comics. In addition, the stories in comics are applied using a contextual approach so that they can facilitate students in understanding the material being taught.

Contextual approach is the concept of learning that connects the learning material with the real-world situation of students, so as to encourage students to make connections between the knowledge they have with their application in everyday life [19].

Based on the explanation of the above problems, researchers are interested in developing learning media with the title "Development of Physics Comic Learning Media Using Applications Toondoo Based on Contextual Approaches to Circular Motion Topics".

2. Research Method

This study uses research and development, the procedural model Borg & Gall. Borg & Gall explained that research and development in education is an industry-based development model that goes through several stages with the aim of producing a learning product that meets certain standards, namely effective, efficient and quality [20]. This is reinforced by Sugiyono that research and development methods or R & D are research methods used to produce certain products, and test the effectiveness of these products [21].

The steps in this study are a modification of the ten main steps of Borg & Gall's research and development. However, in this study researchers limit the development research steps from ten steps to seven steps due to lack of time and limited costs. Includes: 1) Potential and Problems, 2) Data Collection, 3) Product Design, 4) Design Validation, 5) Design Revision, 6) Product Trial, 7) Product Revision. The final product of this study is a physics comic book based on a contextual approach to the subject of the circular motion.

The research data was collected using an expert validation questionnaire, educator response questionnaire, student response questionnaire and data analysis using the Likert scale. In this study using a scale of 1 to 5 with the highest score of 5 and the lowest score 1. So that the total assessment score can be searched by using the formula [22].

Description:

P = Percentage

= Total Score

SMI = Ideal Maximum Score

Then to calculate the overall percentage of subjects using the formula:

Description:

F = Number of percentages of all subjects

= Many Subjects

P = Percentage

Furthermore, to convert scores of expert assessment criteria can be seen in Table 1 [23].

Table 1 The Feasibility Score of the Learning Media

I	n	t	e	r	v	a	l	C	r	i	t	e	r	i	a						
0	-	2	0	%	N	o	t	F	e	a	s	i	b	l	e						
2	1	%	-	4	0	%	L	e	s	s	F	e	a	s	i	b	l	e			
4	1	%	-	6	0	%	Q	u	i	t	e	F	e	a	s	i	b	l	e		
6	1	%	-	8	0	%	F	e	a	s	i	b	l	e							
8	1	%	-	1	0	0	%	H	i	g	h	l	y	F	e	a	s	i	b	l	e

To convert scores of educator and student response criteria can be seen in Table 2 [24].

Table 2 The Interest Score of the Learning Media

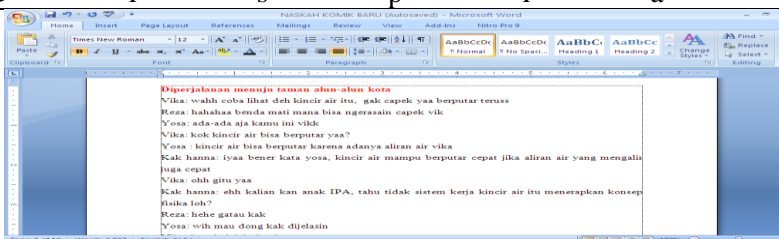
I n t e r v a l C r i t e r i a															
0	-	2	0	%	N o t	I n t e r e s t i n g									
2	1	%	-	4	0	%	L e s s	I n t e r e s t i n g							
4	1	%	-	6	0	%	Q u i t e	I n t e r e s t i n g							
6	1	%	-	8	0	%	I n t e r e s t i n g								
8	1	%	-	1	0	0	%	H i g h l y	I n t e r e s t i n g						




3. Results and Discussion

This research and development produced products in the form of books physics comics developed using the application Toondoo based on a contextual approach to circular motion topics. Physics comic learning media using the application Toondoo based on this contextual approach was created using the application Toondoo online. In addition, the creation of this media was supported by software Microsoft Word 2007 to organize material and to design physics comic books.

The following are some of the displays of products developed from the manufacturing stage to the completion.

Table 3 Display The Process of Making Physics Toondoo Comic

No	P r o c e s s	D i s p l a y
1	Computing media in accordance with the steps of the contextual approach becomes a conversation dialogue between two characters in the Word	

2	Create physics comics using the Toondoo application	 <p>The screenshot shows the Toondoo web application interface. On the left is a grid of various cartoon characters. The main area displays a comic strip with three panels. The first panel has a large 'HA HA' speech bubble. The second panel shows a character saying 'Iish.. kok ketawa sih!!' and 'Vika lucu sih..'. The third panel contains a text box explaining that motorcycles are often called 'setan' (devil) because many people believe they have magical powers (mistis).</p>
3	Compiling physics comic books using Microsoft Word 2007 applications	 <p>The screenshot shows a Microsoft Word document titled 'KOMIK FIK REV - Microsoft Word'. The document contains a compiled comic book with several panels. The panels show characters discussing physics concepts, with one panel featuring a diagram of a wheel and axle. The status bar at the bottom indicates 'Page: 38 of 91', 'Words: 4,470', and 'English (U.S.)'.</p>
4	Display of physics comic books that have been printed	 <p>The photograph shows two printed physics comic books. The book on the left is titled 'KOMIK FISKA' and 'Gerak Melingkar' (Circular Motion). The book on the right is titled 'KOMIK FISIK' and 'Gerak Melingkar'. Both books feature a colorful illustration of a city skyline with a Ferris wheel and hot air balloons. The author's name 'Reni Hidayah' is visible at the bottom of both covers.</p>

Validation of physics comic learning media using the application Toondoo based on a contextual approach to the subject of circular motion was carried out by 5 experts, consisting of 2 material experts, 2 media experts, and 1 linguist. Expert material assessment is done by filling out an assessment questionnaire consisting of 3 aspects, namely aspects of content feasibility, aspects of presentation

feasibility, and contextual feasibility aspects. Then the media expert assessment was done by filling out an assessment questionnaire consisting of 3 assessment aspects, namely comic size, comic cover design aspects, and comic content design aspects. Linguistic assessment consists of 6 aspects of assessment, namely straightforward, communicative, dialogical and interactive, conformity with the development of students, conformity with language rules, and the use of terms, symbols or icons.

3.1 Validation of Material Expert

The results of the validation of material experts on the product are presented in table 4 as follows:

Table 4. Validation Results of Expert Material

No	Aspect Assessment	Feasibility Percentage
1	Feasibility of Comic Content	96.25 %
2	Feasibility of Presentation	93.00 %
3	Feasibility of Contextual	93.33 %
	Average	94.19 %

In Table 4 is the result of the percentage of material feasibility from the physics comic book Toondoo based on a contextual approach to the subject of circular motion obtained from the assessment of the two material experts. The results of the feasibility assessment obtained were 96.25% for aspects of content feasibility, 93.00% for aspects of presentation feasibility, and 93.33% for contextual feasibility aspects. From the results of the assessment of the three aspects of material feasibility, the average feasibility of comic book material Toondoo based on the contextual approach of circular motion material was 94.19%.

Assessment data by material experts on physics comic book Toondoo is also presented in the form of graphs in figure 1. to find out the comparison of the results of the assessment on each aspect.

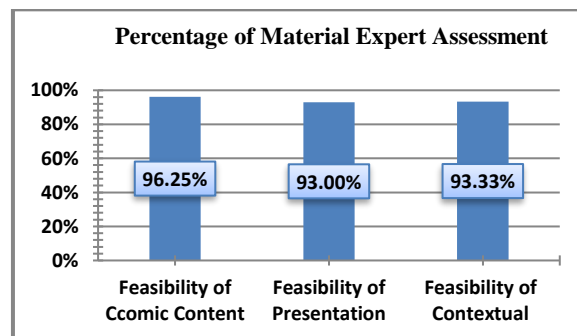


Figure 1 Graph of Material Expert Validation Results

3.2 Validation of Media Expert

The results of media expert validation assessment on products are presented in table 5 as follows:

Table 5 Validation Results of Expert Media

No	Aspect Assessment	Feasibility Percentage
1	Feasibility Comic Size	95.00 %
2	Feasibility Comic Cover Design	86.25 %
3	Feasibility Comic Design Contents	87.14 %
	Average	89.46 %

In table 5. is the result of the percentage of the feasibility of the design of physics comic book Toondoo based on a contextual approach to the subject of circular motion obtained from the assessment of the two experts. In the comic size aspect, the percentage obtained was 95.00% with very decent categories, comic cover design aspects 86.25% with very decent categories, and 87.14% for the comic design aspects with very decent categories. From the results of the assessment of the three aspects, the average results of the feasibility of the physics comic book design Toondoo based on the contextual approach of circular motion subject were 89.46% with very feasible categories.

Data from media validation results on the physics comic book Toondoo based on a contextual approach, also presented data in the form of graphs in Figure 2 to determine differences in assessment results in each aspect.

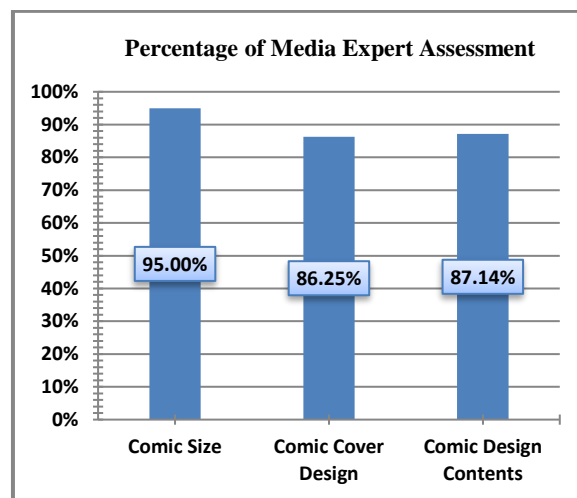


Figure 2 Graph of Media Expert Validation Results

3.3 Validation of Language expert

Language validation assessment results on the product are presented in Table 6 as follows:

Table 6 Results of Validation Language

Table 6 Results of Validation Language				
N	o	A s p e c t	A s s e s s m e n t	Percentage Feasibility
1		L a n g u a g e P r o f i c i e n c y		8 0 . 0 0 %
2		C o m m u n i c a t i v e a n d I n t e r a c t i v e		1 0 0 . 0 0 %
3		D i a l o g i c		1 0 0 . 0 0 %
4		C o n f o r m i t y o f d e v e l o p m e n t o f s t u d e n t s		9 0 . 0 0 %
5		S u i t a b i l i t y o f L a n g u a g e R u l e s		8 0 . 0 0 %
6		U s e o f T e r m s a n d S y m b o l s		8 0 . 0 0 %
		A v e r a g e		8 8 . 3 3 %

Based on table 6 data can be obtained from language validation. In the aspect of language proficiency the percentage obtained is 80.00% with a feasible category, communicative aspects obtained percentage of 100.00% with very feasible categories, dialogical and interactive aspects of the percentage obtained 100.00% with very feasible categories, aspects of conformity with the development of participants The percentage of students obtained is 90.00% in the very feasible category, aspects of conformity with language rules 80.00% obtained percentage with decent categories, and aspects of the use of terms, symbols or icons obtained 80.00% percentage with a decent category. From the results of the assessment of the six aspects, the results of the average feasibility of physics comic book language Toondoo based on the contextual approach of circular motion subjects were 83.33% with very feasible categories.

Language validation data on physics comic books Toondoo based on a contextual approach, are also presented in graphical form in figure 3 to compare the results of language validation assessment in each aspect.

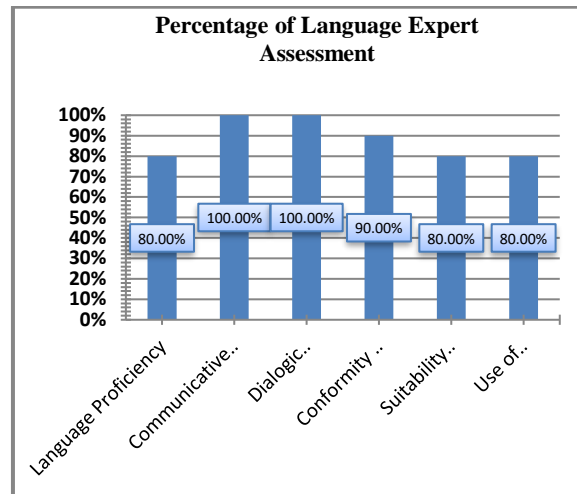


Figure 3 Graph of Language Expert Validation Results

After the product has been validated, product testing is conducted on students and educators of class X on physics comic learning media using application Toondoo based on a contextual approach to the subject of the circular motion.

3.4 Small Group Trial

Trials In this small group trial conducted by 10 students from each school namely, SMA N 17 Bandar Lampung, SMA Al Huda Jatiagung Lampung Selatan, and SMA Taman Siswa Teluk Betung.

The results of the small group trial assessment are presented in Table 7 as follows:

Table 7 Small Group trial Results

Table 1. Student Group Academic Results														
N	o	A s p e c t s			A s s e s s m e n t			P e r c e n t a g e						
1	M	a	t	e	r	i	a	l	8	4	.	3	7	%
2	L	a	n	g	u	a	g	e	8	3	.	3	3	%
3	I	n	t	e	r	e	s	t	8	9	.	1	3	%
	A	v	e	r	a	g	e	8	5	.	6	1	%	

In Table 7 is the result small group trials in three schools which the researchers then calculated the percentage of attractiveness scores from each aspect. In the material aspect, the percentage of interest obtained was 84.37% in very interesting categories, the language aspect was 83.33% with very interesting categories, and the aspect of interest was 89.13% with very interesting categories. From the results of the assessment percentage, the three aspects obtained the average yield of 85.61% with very interesting categories.

In addition to the form of the results of the assessment of small group trials on physics comic book learning media using the application Toondoo based on a contextual approach, also presented data in the form of graphs in Figure 4 to see a comparison of the assessment results in each aspect.

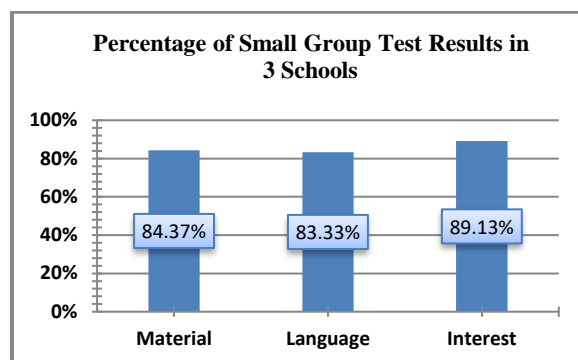


Figure 4 Graphs of Small Group Test Results

3.5 Field Test

This field test was conducted in three classes, each class consisting of 30 students in 3 schools, namely SMA N 17 Bandar Lampung, SMA Al Huda Jatiagung Lampung Selatan, and SMA Taman Siswa Teluk Betung. Field trial procedures are the same as small group trials, namely by filling out an assessment questionnaire.

The results of the field test assessment are presented in the form of table 8 as follows:

Table 8. Field Trial Results

N	o	A s p e c t	A s s e s s m e n t	P e r c e n t a g e
1		M a t e r i a l	8 3	. 4 2 %
2		L a n g u a g e	8 4	. 5 1 %
3		I n t e r e s t	9 0	. 0 9 %
		A v e r a g e	8 6	. 0 1 %

In table 8 the results of the trial the field were conducted in three schools which the researchers then calculated the percentage of attractiveness scores from each aspect. In the assessment of the material aspect, the attractiveness percentage was 83.42% in the very interesting category, the assessment of the language aspect gained an attractive percentage of 84.51% in the very interesting category, and the aspect of attraction was 90.09% with a very interesting category. So that the average score of these three aspects is 86.01% with very interesting categories.

In addition to the form of table results of the assessment of field trials on physics comic book learning media using the application Toondoo based on a contextual approach, also presented data in the form of graphs in Figure 5 to see a comparison of the assessment results in each aspect.

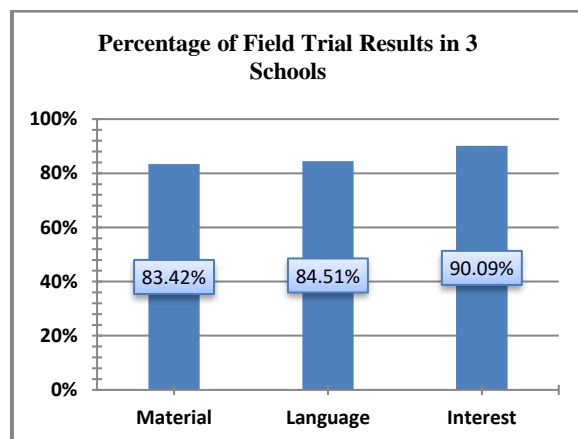


Figure 5. Graph of Field Test Result

3.6 The Results of an Educator Assessment

The results of the educator assessment were obtained from the research questionnaire filled by educators of physics subjects in SMA N 17 Bandar Lampung, SMA Al Huda Jatiagung Lampung Selatan, and SMA Taman Siswa Teluk Betung. The teacher assessment questionnaire consists of 3 aspects of assessment, namely material aspects, aspects of language, and aspects of interest.

The results of the educator assessment are presented in table 9 as follows:

Table 9 Results of Educator Assessment

Table 3 Results of Educator Assessment						
N	o	A s p e c t	A s s e s s m e n t	P e r c e n t	a g e	
1	M	a t e r i a l	s	8 8 .	5 7	%
2	L	a n g u a g e		8 8 .	8 8	%
3	I	n t e r e s t		8 8 .	3 3	%
	A	v e r a g e		8 8 .	5 9	%

In table 9 is the results of the assessment of educators in 3 schools the researcher then calculates the percentage of attractiveness scores from each aspect. In the material aspect study, 88.57% of the interest percentage was obtained in the very interesting category, the language aspect assessment gained 88.88% interest in the very interesting category, and the aspect of interest assessment received an attractive percentage of 88.33% in a very interesting category. So that the average score obtained from these three aspects is 88.59% with very interesting categories.

The results of the assessment of educators in 3 schools on the physics comic book learning media using application Toondoo based on a contextual approach, also presented in the form of graphs in Figure 6 to see a comparison of the assessment results in each aspect.

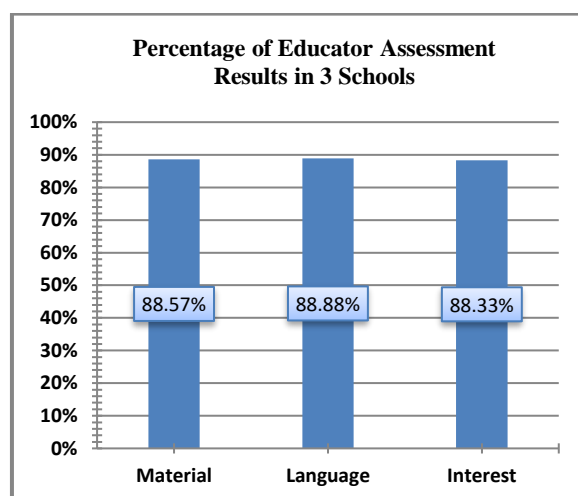


Figure 6. Graph of Results of Educator Assessment

Products that have been successfully developed in the form of physics comic learning media using application Toondoo based on a contextual approach to the subject of the circular motion. After validation and product testing, the physics comic book learning media used application Toondoo based on a contextual approach to the subject of circular motion, declared "Very Feasible" and "Very Interesting" to be used as learning media.

4. Conclusion and Suggestions

4.1 Conclusion

The development of physics comic learning media using the application Toondoo based on a contextual approach is feasible and interesting to use in learning. Product feasibility based on the assessment of material experts, media experts, and linguists. The assessment of material experts received an average

score of 94.19% in the very feasible category. The media expert's assessment got an average of 89.46% feasibility percentage in the very feasible category. The assessment of linguists gets the average result of the 83.33% eligibility percentage in the very feasible category. Whereas for product attractiveness based on small group trials, field trials, and educator assessment. In the results of small group trials conducted in 3 schools, the average yield of 85.61% attractiveness percentage in the category was very interesting. In the field trial, the average percentage of interest was 86.01% in the very interesting category. The assessment results of educators in 3 schools get an average percentage of 88.59% in a very interesting category.

4.2 Suggestions

Based on the results of the study, discussion and conclusions can be suggested as follows:

- 4.2.1 For educators, physics comic learning media using applications Toondoo based on contextual approaches are expected to be used in the learning process.
- 4.2.2 For further researchers, can develop physics comic learning media using the application Toondoo in an electronic book version with different physics approaches and materials.

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