



Doodle Notes As A Media And Learning Evaluation For The Sub-Topic Of Concave Mirror In Physics Lesson

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ABSTRACT

Physics as subject is commonly associated as a complicated and a hard-to-master subject in schools. Due to the problem, the teacher must be made something interesting or eye-catching about physics when explaining the concept to the students. In this study, physics subjects will be packaged using doodle notes on concave mirror learning. This study purpose to know doodle notes that students like, to make students enthusiastic in physics subject and know students' understanding of material made on doodle notes. Respondents in this study were 12 students of 8th grade in SMP Kristen Satya Wacana- Central Java. This study uses the descriptive research method and the instrument is observation sheets, doodle notes design that are corrected by students, evaluation questions, questionnaire, and interviews. Based on observations 87, 5% of 100% all students focus and are interested in the given doodle notes; result shows that 58, 3 % of 100% students chose the first type of interesting doodle notes; the percentage of enthusiasm students of doodle notes as much as 75 % of 100%; and based on the evaluation result, as much 92 % of 100% students got ≥ 70 scores with average scores 77, 04. Based on the questionnaire result, all students gave positive respond $\geq 70\%$ of 100% for each indicator. This study shows that using doodle notes make students enthusiastic in physics subject and helping students to understand physics subject.

Keywords: Physics, interesting, doodle notes

INTRODUCTION

Physics as subject is commonly associated as a complicated and a hard-to-master subject in schools, there has been a finding that explains why students consider physics as a lesson that is difficult to understand because it requires memorization and contains mathematical elements (Samudra, Suastra & Suma, 2014). This is also because the teacher does not display something interesting or eye-catching about physics when explaining the concept to the students (Ornek & Haugan, 2008). Even though based on Minister of National Education Number 41 of 2007 concerning process standards mandated that in the core activities of learning must be

carried out interactively, inspiring, fun, challenging, and motivating students to actively participate in understanding and exploring learning material with pleasant conditions.

Furthermore, the problem that arises is the lack of interest of students to take notes. Even though according to the results of the study it was found that the higher the student's attitude towards behavior the students' memory capacity would tend to increase (Dewi & Indrawati, 2014). Nowadays, students are now also using technology more in carrying out taking notes activities, namely was using a laptop or taking photos using a mobile phone. Students feel that using a laptop or taking

photos using a mobile phone, information collected from a blackboard/whiteboard is faster and more efficient, so students are less interested in handwriting notes (Mueller & Daniel, 2014). Even though based on the research carried out, when evaluating students who taking notes with handwriting had good value compared to students who taking notes using a laptop. This is reinforced by the findings based on three studies conducted, that students who take note using a laptop had a worse understanding when given concept questions compared to students who take note with handwriting. Even though based on research, it was found that qualities of notes were take notes that did not focus on the quantity written. This means that good notes are simple and quality notes that can be easily understood by students when used for learning (Friedman, 2016).

Furthermore, to make students enthusiastic about physics learning and showing sufficient interest in physics subject we need a new innovation. The innovation on this study is using doodle to combine taking notes or called doodle notes on physics subject. Doodle notes that are made used as media and learning evaluation of physics subject. In previous studies no one has researched about doodles in physics subject, so it can be said this is a new research. In previous studies doodle used on english subject, that The use of doodles has also been done in Maritime English on Constanta Maritime University Romania, the research result is doodling proves to be extremely helpful in teaching English for special purpose, especially Maritime English, as it enables students to create a personal visual pathway to learning new concepts ord words (Mates & Barbu, 2016). Other studies show that doodling decreases the level of autonomus arousal, accompanied by day dreaming and tiredness, and keeps the person conscious by increasing concentration (London, Schubert & Washburn, 1972). It can be said that improving concentration indeed affects

the learning positively (Holmes *et al.* 2010). Also other studies, doodling is more than mindless scribbling on a piece of paper—it is a creative way to visualize thinking, which leads to a deeper understanding of concepts (Brown, 2014). Students' use of doodling from the beginning would help improve this habit because most visualization skills can be improved by practicing (Stokes, 2002). In another studies using doodle as a learning design has been carried out by Fatmawati Tugas Utami, where the results of her research are students' motivation, creativity, and learning outcomes increased achievement in drawing batik using doodle art. Furthermore, the doodling group performed better than monitoring task and recalled more information on a surprise memory test (Andrade, 2010). Also another studies doodling has several benefits: (1) increasing student focus in taking notes, (2) releasing stress because doodle will use color games, (3) memory strategies, (4) increasing concentration of students, (5) students will pay attention to details (Andrade, 2009; Boggs, Cohen & Marchand, 2009; Tadayon & Afhami, 2016).

Therefore, this article research purposes to **(1)** create and develop Physics doodle notes that are of interest to students, **(2)** make students enthusiastic in writing Physics material, and **(3)** know students' understanding of material made on doodle notes.

RESEARCH METHOD

This study uses the descriptive research method (Jackson, Sherri L, 2009). The instrument is **(1)** observation sheet to record the enthusiastic of students on doodle notes, **(2)** doodle notes design that are corrected by students to make new doodle notes that used for sub-topic of concave mirror material, **(3)** evaluation questions to determine respondents understanding about sub-topic of concave

mirror material on doodle notes , (4) questionnaire to view responses about doodle notes, (5) interviews to determine the difficulties that respondents and obtain suggestions for improving their doodle notes. The results of the evaluation questions and questionnaire will be analysis with score based on condition Table 1.

Table 1. Coding of Respondents' Responses

Category	Score
Totally Agree	4
Agree	3
Not Agree	2
Disagree	1

Source: Riduwan (2011)

Table 2. Score Guidelines

Percentage (%)	Category
100 - 76	Very Good
75 - 51	Good
50 - 26	Less
25 - 0	Very Poor

The respondents in this study were 8th-grade students of Satya Wacana Christian Middle School as many as twelve (12) respondents. All data that were analyzed descriptively and qualitatively to determine the effectiveness of the doodle notes towards student's enthusiastic and understanding about sub-topic concave mirror. Moreover, the criteria for achievement in this assessment are as follows: (1) doodle notes are effective to make students enthusiastic, if 70% of students choose to make doodle notes for a given assignment, (2) Doodle notes are said to be effective in helping students understand the material if 70% of the sample scores ≥ 70 of 100 and the sample

average is ≥ 70 , (3) said doodle notes are effective in generating positive attitudes of students towards learning Physics when giving $\geq 70\%$ positive responses.

RESULTS AND DISCUSSION

The first essential action to be done before giving doodle notes to students, the authors made four types of doodle notes Physics with the light topic and flat mirrors. The purpose of making these four types of the doodle is to find out which types of doodle notes are interesting for students. The four types of doodle include: 1) full-color Doodle notes with shorts content, lots of pictures, and keywords, 2) Doodle notes monochrome with short content, lots of pictures, and keywords, 3) Doodle notes full-color with lots contents of material and additional notes, 4) Doodle notes monochrome with lots of material contents and additional notes. Following is four types of doodle notes that shown in figure 1-4.

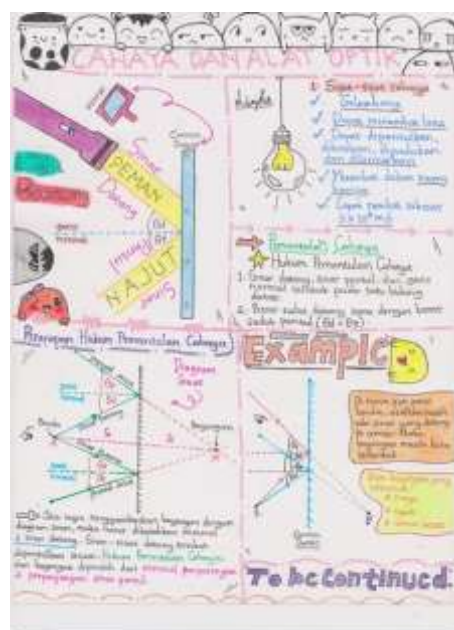


Figure 1. 1st Doodle Notes

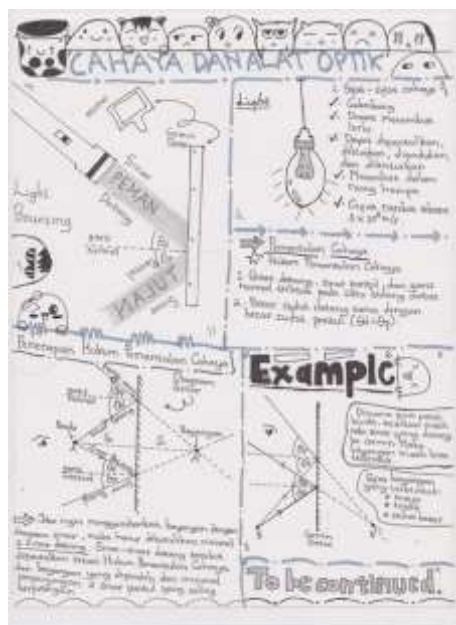


Figure 2. 2nd Doodle Notes

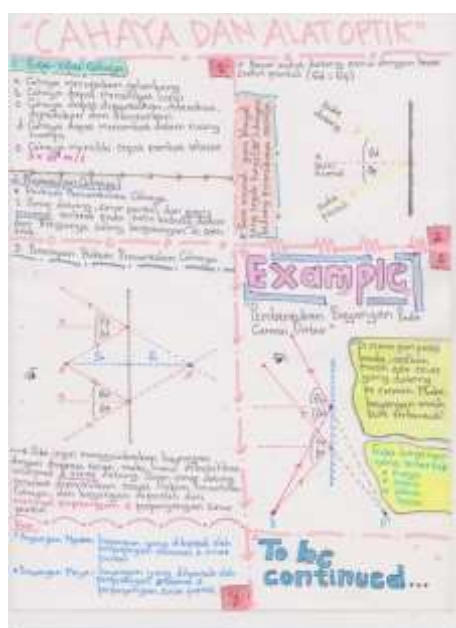


Figure 3. 3rd Doodle Notes



Figure 4. 4th Doodle Notes

Furthermore, the four doodle notes are given to students to be read in stages and students are given the freedom to advise about doodle notes so that doodle notes can be further developed. The four of doodle notes given to students, 7 (58,3%) chose the first type of doodle notes, 3 people (25%) chose the second type of doodle notes, 1 person (8,3%) chose the third type of doodle notes, and 1 person (8,3 %) choose the fourth type of doodle notes. The first type of Doodle notes is the most chosen so that it can be said that doodle notes that appeal to students is full-color doodle notes with material content little, lots of pictures and keywords. Based on observers' observations 87.5% of students in the class were focused and interested in the doodle notes given. This calculation uses the average equation

$$N = \frac{n}{n_{\max}} \times 100$$

From the doodle notes design that are corrected by students , it was obtained that the main reason students choose full-color doodle notes with little material

content, lots of pictures, and the most interesting keywords, because it is not monotonous to read, there are examples of applications in everyday life and arouse passion for learning. However, students give more suggestions in preferences, preferably the colors used on doodle notes are not too much and more integrated with the image, and modify the writing in this case the type of writing is different. After that, students are given the assignment to summarize the sub-topic of concave mirror. Students are given two choices of summarize with doodle or ordinary.

After one week the assignments are collected and the results, 9 people (75%) collect the assignments in the form of doodle notes, with the contents of the doodle notes they make are in full color and monochrome, containing doodle images, short material contents, and keywords. So it can be said that these 9 students prefer the form of notes such as doodle notes. For the other 3 people (25%) collect assignments in the form of regular notes. The usual note in question is a note in general, which is a note containing a lot of writing and fixated on the line of a notebook. So it can be said that these 3 students preferred the usual notes form compared to doodle notes. From the results of the given assignment, more students choose or are interested in making assignments in the form of doodle notes rather than ordinary notes, so it can be said that doodle notes make students enthusiastically to summarize the material provided.

After the selection of interesting types of doodle notes and the assignment of tasks is done. Students are given evaluations to find out their understanding of concave mirrors. The evaluation given is that students read concave doodle notes for 20 minutes, after which students are given a form of doodle notes, a concave mirror material that is completed for 25 minutes. Following are the doodle notes material and evaluation for concave mirror topic, that shown in figure 5-6.

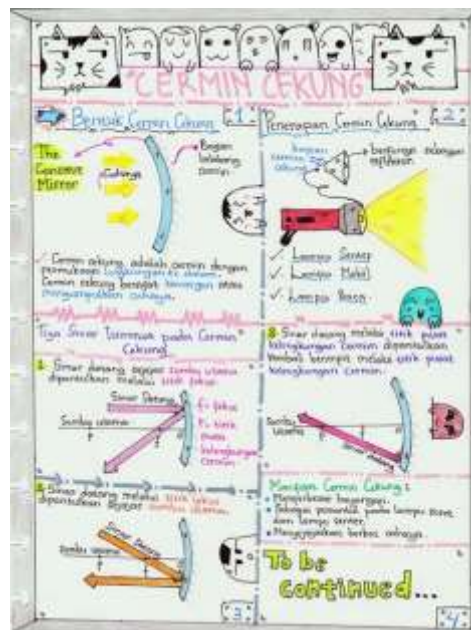


Figure 5. Doodle Notes Material
"Concave Mirror"



Figure 6. Doodle Notes for Evaluation

The contents of the concave mirror doodle notes in Figure 6 include the shape of a concave mirror, the definition of a concave mirror, the application of a concave mirror, three special rays on a concave mirror, and the benefits of a concave mirror. The concave mirror topic doodle notes are given sequential numbers so students do not get confused reading the material. Figure 7 is a concave mirror

material evaluation quiz, which contains questions about depicting the shape of a concave mirror, understanding of a concave mirror, three special rays on a concave mirror, and reasoning for using a concave mirror as a reflector on a flashlight. The evaluation results can be seen in Table 3.

Table 3. Evaluation Results

No	Student	Result	Category
1	A	100	Very Good
2	B	90	Very Good
3	C	87.5	Very Good
4	D	75	Good
5	E	78.5	Very Good
6	F	75	Good
7	G	73	Good
8	H	72.5	Good
9	I	70.5	Good
10	J	70	Good
11	K	70	Good
12	L	62.5	Good
Average		77.04	Very Good

After the evaluation, the test results are then analyzed and the findings are 11 students (92%) get a score of ≥ 70 out of 100 and 1 student (8%) get a value < 70 , with an average student score of 77.04. This shows that doodle notes **helps** student to understand about about sub-topic concave mirror.

From the results of interviews, the students argued that the questions that were evaluated is the same in the material of doodle notes and were easy to understand. The factor that makes it easy for most students to understand the topic is due to the

color factor in handwriting and picture. Based on the results of the study it turns out that color has a positive effect on short term memory which makes it easier for students to remember the contents of the topic (Sujarwo & Oktaviana, 2017). Color also works as a powerful information channel for the human cognitive system and it has been found that color has a significant role in improving memory performance (Wichmann *et al*, 2002). Another factor that influences is the learning experience. Students have been given the task of making concave mirror doodle notes and have studied concave mirror topic while in elementary school, so students are familiar with the concave mirror topic. These two factors make the majority of students get ≥ 70 evaluation results on the doodle notes evaluation problem, so this shows that using doodle notes as a media and learning evaluation helps students to understand the concave mirror topic.

There was another finding when assessing students answer. Most students are less precise in the description and writing of three special rays in a concave mirror. The author assumes that sourced from the material doodle notes given. Doodle notes material provided that has many colors in pictures and writing, so when evaluating students have difficulty remembering and confused to draw and write three special rays on a concave mirror. Another factor is the lack of time to read doodle notes, so students do not understand very well about the material of three special rays on a concave mirror.

Students are given a questionnaire sheet to see their assessment of the doodle notes and doodle notes evaluation sheets. The questionnaire sheet has 10 indicators, where indicators 1-2 regarding the use of images and interest of students. Indicators 3-4 regarding the contents of doodle notes is easy to understand and compatibility the questions with the material. Indicators 5-7 regarding the quiz questions, clarity of writing on quizzes and material. Indicators

8-10 regarding the use of language, colors, and sentences. Scale choices are given 4, 3, 2, and 1, where 4 is the highest scale and 1 indicates the lowest scale. The larger-scale chose the more positive the responses were given by students.

Percentage of positive student attitudes towards doodle notes that have been given using the average or average formula. The target of achievement in this study was $\geq 70\%$ of students gave a positive response to the questionnaire. The results of the assessment of student responses can be seen in Table 4.

Table 4. The average results of the questionnaire assessment by 12 students

Indicators	Average Student Response (%)	Category
1. Use of images	93,75%	Very Good
2. Interested in doodle notes	91,67%	Very Good
3. The contents of the doodle notes material are easy to understand	91,67%	Very Good
4. Suitability of the material with the quiz	87,50%	Very Good
5. Quiz questions are easy to understand	85,42%	Very Good
6. Clarity of writing on the quiz	85,42%	Very Good
7. Clarity of writing on the material	83,33%	Very Good
8. Use of language	83,33%	Very Good
9. Use of color	83,33%	Very Good
10. Use of sentences	81,25%	Very Good

The results of this questionnaire showed that each indicator received a positive response $\geq 70\%$ of 100 %. Students assume that learning by using a summary of doodle notes helps them understand the material. Students give a rating of over 90% for indicators: (1) use of pictures, (2) interest in doodle notes, and (3) the contents of doodle notes are easy to understand. Indicator number ten (10) get the lowest score, it can be said there are still a few students who do not understand about the material on doodle notes. This further confirms that with the use of attractive

images and colors, students will be more interested in reading and making doodle notes and helping them to understand the physics topic provided

Thus, the used doodle notes as a media an learning evaluation can be **effective** to increase students enthusiasm for learning physics and make to understand the subject.

After filling out the questionnaire, interviews were conducted with students as respondents from this study. Students claimed that use doodle notes for physics subject is more fun than study as usual, because it can play colors and make notes

easy to understand. Another students also had difficult to make doodle notes, because making doodle notes must be good at drawing. In addition, students gave some suggestions that the sentences used in the doodle notes should be simpler and use three (3) to four (4) colors only. The results showed that doodle notes were effective in physics learning on sub-topic concave mirror. These findings were consistent with other research in the literature, that students used doodle were more successful than those who did not doodle (Tadayon & Afhami, 2016). This is because the doodle notes were made is differently from other doodles. This doodle notes is made like a comic, were there are several chapters that make the reader more curious and interested. Another thing is this doodle notes can used to make evaluation sheets like figure 6 or assignment to find out students of absorb information.

CONCLUSION

The doodle notes that has been using for media and learning evaluation of sub-topic concave mirror is **effective** in helping students to more understand about physics and make students enthusiasm to learn physics. For teacher, this study helping to make new method to learning in class. However, this study still has limitation is requires a lot of time when doodle notes made in class and lack of study resources on doodle notes. Therefore, it is suggested that the next studies can develop the doodle notes to another physics topic, make new design which doesn't take much time, and increase the number of respondents so that the effectiveness of doodle notes will be higher. For the further research, it can be develop for HOTS questions in doodle notes evaluation.

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