

THE DEVELOPMENT E-BOOK MEDIA BASED STEM USING KVISOFT FLIPBOOK MAKER IN KINEMATICS

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DOI: <https://doi.org/10.56293/IJASR.2022.5453>

IJASR 2022

VOLUME 5

ISSUE 6 NOVEMBER - DECEMBER

ISSN: 2581-7876

**Abstract:** This study research aims to determine to develop e-book media based on STEM (Sains, Technology, Engineering, and Mathematics) using kvisoft flipbook maker in subject matter of Kinematics as well as valid, effective and feasible to use. This e-book media only use in one subject that is Physics subject. This study was conducted in class X at three schools they are SMA Dharma Pancasila, SMA Wathaniyah, and SMA Muhammadiyah 1. This E-book media which based on STEM created into several formats such as pdf, html, mp4, and exe.

This research method uses Research and Development (R&D) Borg and Gall. The selection of 3 schools was based on purposive sampling, its based on specific considerations and purposes. This study research type is a quantitative descriptive study. The data collection techniques used were questionnaire methods and documentation.

The result of this study shows that: 1) E-book media based STEM is valid as the validation result from matter expert and media expert 2) Effectiveness stage is seen from pretest value and posttest value of X grade students from three schools. 3) Eligibility according to questionnaire responses a) The Percentage of eligibility score from matter expert 86,5 % b) The percentage of eligibility score from media expert 80,56% c) The percentage score of response's reviewer teacher from three schools are 83,33 %, 91,07 %, and 96,67% d) The percentage test score of response initial stage student trial 77% e) The percentage score of response from student's reviewer limited group field trial of three schools from SMA Dharma Pancasila 70,84%, SMA Wathaniyah 88,9 % and SMA Muhammadiyah 1, 74,14 %. According to the result of evaluation and questionnaire response can conclude that e-book media based STEM using kvisoft flipbook maker is very feasible and developing.

**Keywords:** e-book media, STEM, Kinematics, kvisoft flipbook maker

### Introduction

The development of information technology is developing rapidly so that it can affect various aspects of human life, including human learning and learning activities. The development of technology in digital form has made hardware and software smaller, portable and more modern. This has changed the learning pattern to be more flexible. Each individual can use technology media and carry out learning activities without being bound by time and space factors. The development of information technology has also produced a variety and variety of media containing a variety of information and knowledge that can be studied as needed (Pribadi: 2017).

Physics is the study of natural phenomena and phenomena. Therefore, in learning physics, an educator must be able to invite students to experience natural phenomena directly. So that teachers need media to explain the phenomena in physics learning. Learning media that contain information and knowledge that can be used to make the teaching and learning process effective and effective (Pribadi: 2017). According to Sani (2019) Learning media can be defined as tools or methods used by educators to be used by students in achieving learning goals. The right learning media can increase interest in learning and motivation of students in learning. The use of instructional media in the teaching and learning process really helps students understand certain concepts. The use of appropriate media and methods in learning can increase the efficiency of the independent learning process (Ruiji, 2012).

During the Covid 19 pandemic, learning that was usually face-to-face turned into e-learning. Based on Jaya Kumar dalam Rusman (2014), *e-learning* is learning that uses electronic circuits (*LAN, WAN, or internet*) to convey learning content, interaction, or guidance. Meanwhile, Dahiya et al (2012) define e-learning as information and communication technology to enable students to learn anytime and anywhere. Educators mostly use social media, learning media and meeting media in bold learning activities. Many educators use LMS (Learning Management System) such as using SIPDA, google classroom, schoology and others in learning. Based on an interview with a physics teacher at SMA Dharma Pancasila, he said that learning activities use Google classroom because it can send video quiz teaching materials and student attendance. Several students of SMA Dharma Pancasila also confirmed the teacher's statement, during the Covid period 19 teachers used Google classrooms, but there needs to be a change in media, especially innovative media to attract interest in studying at home, because if you only provide material with the same media every week it can be boring. So based on the above problems, we need media that can attract students' attention, namely e-book media. Electronic books or e-books or digital books are electronic versions of books. The books used by the community so far consist of a collection of papers containing text and images. While e-books consist of text, images, videos. E-books can also be made into several formats such as plain text, pdf, JPEG, LIT, HTML and OPF (open electronic bookpackage), flipbooks. Each format has its advantages and disadvantages.

At this time many educators made e-books. For example, research by Ghofur and Kustijono (2019) regarding the development of a flash-based e-book kvisoftflipbook on straight motion kinematics material as a learning tool for grade X high school students. But no one has made STEM-based e-book media using kvisoft flipbook maker on kinematics material. The kinematics material to be made consists of straight motion, parabolic motion, and circular motion. The use of media as teaching material is in the form of a flipbook which creates a conducive and interesting atmosphere in learning physics.

According to Sugianto et al (2013), the software used in the flipbook media is Kvisoft Flipbook Maker to make a book display or other teaching material into an electronic book. This learning media can reduce the statistical atmosphere and can create an effective, interesting, interactive, and fun learning process.

In this study research, the e-book is based on STEM. According to Brown et al (2011) STEM is a meta-discipline at the school level where science, technology, engineering, mathematics teachers teach an integrated approach and each discipline material is not divided but into a unit and as a dynamic whole. Kelley, et al (2016) state that integrated STEM education is an approach to teaching two or more STEM fields by involving STEM practices in connecting each field so that STEM can improve student learning.

Several relevant studies show that the use of flipbook learning media can improve student learning outcomes where the mean score of the initial test was 36.11 in the experimental class as a media user class increased to 84.44 with an increase of 57.23% by Haryati (2015). Research by Hari (2016) states that there is the use of learning media in the form of innovative flipbooks with learning using conventional media.

The study research objectives to be achieved in this study are: (1) To develop an e-book based on STEM using the kvisoft flipbook maker on valid kinematics material. (2) To develop an e-book based on STEM using the kvisoft flipbook maker on effective kinematics materials. (3) To develop an e-book based on STEM using the kvisoft flipbook maker on kinematic materials that are feasible to use.

### Research Methods

This study uses the Research and Development (R & D) method. The procedure used is 7 stages out of 10 stages of the Borg and Gall method modified by Sugiyono, namely Potentials and Problems, Collecting Data, Product Design, Design Validation, Design Revision, Product Trial, Product Revision (Sugiyono, 2012).

This research will be carried out in three schools, namely SMA Dharma Pancasila, SMA Wathaniyah, and SMA Muhammadiyah. The population in this research is all class X students at SMA Dharma Pancasila, SMA Wathaniyah, and SMA Muhammadiyah. The research samples were X-1 SMA Dharma Pancasila, X-1 SMA Wathaniyah and X-1 and SMA Muhammadiyah. The instrument or data collection tool in this study was to use a questionnaire, observation and documentation.

According to Creswell (2012), a questionnaire is a technique filled with data in which participants/ respondents state a statement or question and then are filled in completely back to the researcher (Sugiono, 2017). Questionnaires were given to media experts, material experts, teachers and students.

Observations are carried out non-systematically and do not use observation instruments, observations are made by looking directly at teaching and learning activities in the class in order to analyze the learning media used by the teacher in supporting learning activities. Documentation in the form of photos when using the e-book media, learning outcomes tests, and filling out questionnaires.

This research is a quantitative descriptive study, namely analyzing quantitative data in the form of numbers obtained from expert test questionnaires and field tests. Data in the form of calculated numbers or numerical measurements are added and then compared with the expected amount so that the proportion is obtained. Interpreting the proportion of answers to the validation sheet as a whole using interpretation based on Arikunto (2010).

**Table 1. Score Interpretation (Percentage) Validation Sheet.**

Percentage	Criteria
80,1% - 100%	Very high
60,1% - 80%	High
40,1% - 60%	Standard
20,1% - 40%	Low
0,0% - 20%	Very low

$$P = \frac{X}{X_i} \times 100\%$$

Information:

P = Percentage of each criteria

X = Score of each criteria.

X<sub>i</sub>= Maximal score of each criteria

**Table 2. Eligibility Percentage Scale**

Presentage of Achievement	scale	Interpretation value
76% ≤ score ≤ 100%	4	Very worthy
51% ≤ score ≤ 75%	3	Worthy
26% ≤ score ≤ 50%	2	Worthy enough
0% ≤ score ≤ 25% 1	1	Less like

To test the effectiveness of experimental video media based on a scientific approach, it is obtained in the following ways:

$$X = \frac{\text{The number of scores obtained}}{\text{The numbers of scores}} \times 100\%$$

**Table 3. The effectively evaluation of media**

Score	Criteria	Percentage
A	Very good	80% < X < 100%
B	Good	60% < X < 80%
C	Standard	40% < X < 60%
D	Not good	20% < X < 40%
E	Not very good	0% < X < 20%

Results And Discussion

This research produces a product using a STEM-based e-book that is valid, effective and very suitable to use. This STEM-based e-book media is made into several formats such as pdf, html, MP4 and exe.

Research Results

1. Research and data collecting

a. Needs analysis,

Based on previous research, researchers found problems that had arisen by teachers and students. Teachers must choose the right media for online learning in order to foster student interest. Then give a questionnaire for the teacher and interviews with several students. According to the teacher, when learning is needed the right media that can replace books.

b. Literature Review

Conduct studies in the form of books and journals. A literature study was conducted in order to assess the STEM-based e-book media.

c. Small scale research

Researchers conducted a field study, by interviewing students via WhatsApp about how teachers teach.

2. Planning

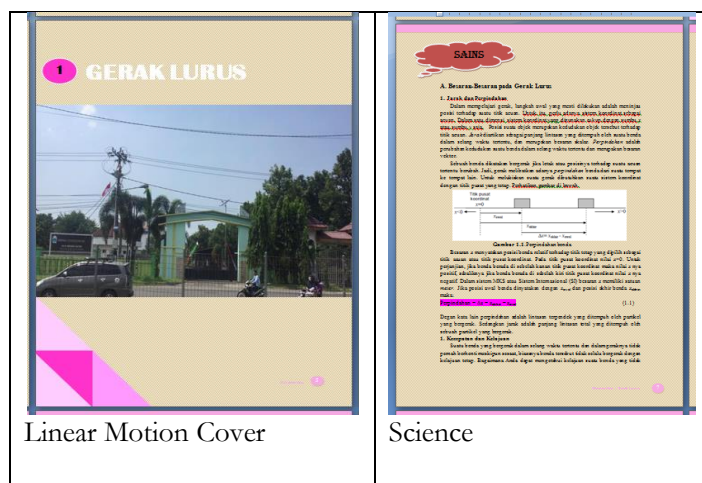
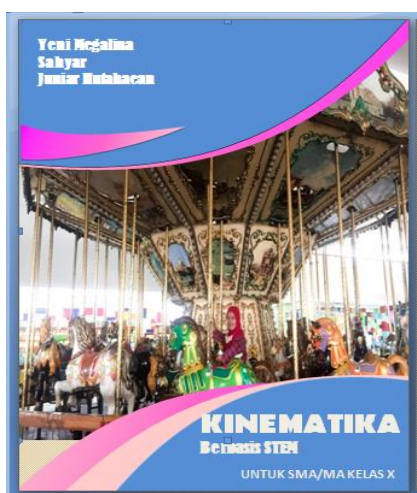
The e-book media design was developed to:

- a. The teacher is able to attract and motivate students in learning physics kinematics material
- b. The target users of the product, namely grade X students in three schools, namely SMA Dharma Pancasila, SMA Wathaniyah and SMA Muhammadiyah get material with different media than usual.
- c. The e-book media created can achieve the learning objectives, namely so that students are able to explain straight motion, circular motion and parabolic motion

3. Initial product development

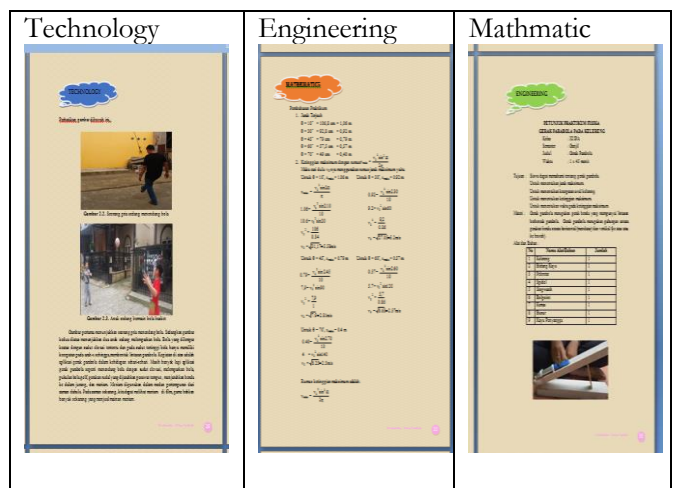
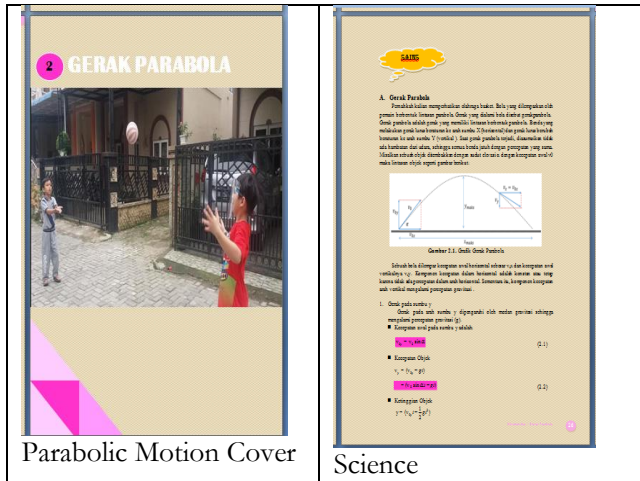
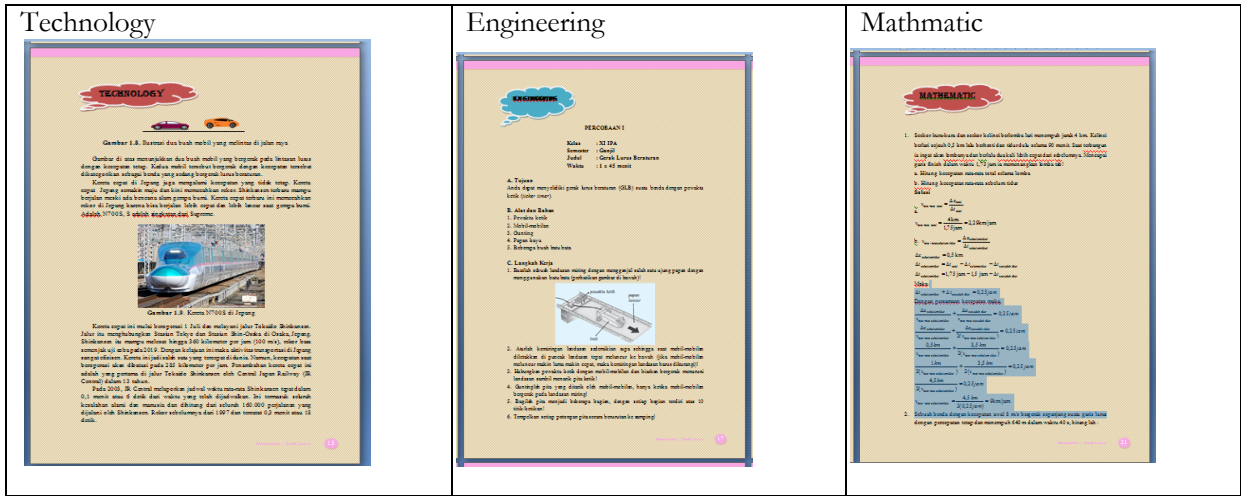
The initial product was an e-book media using the Kvisoft flipbook maker:

Cover e-book

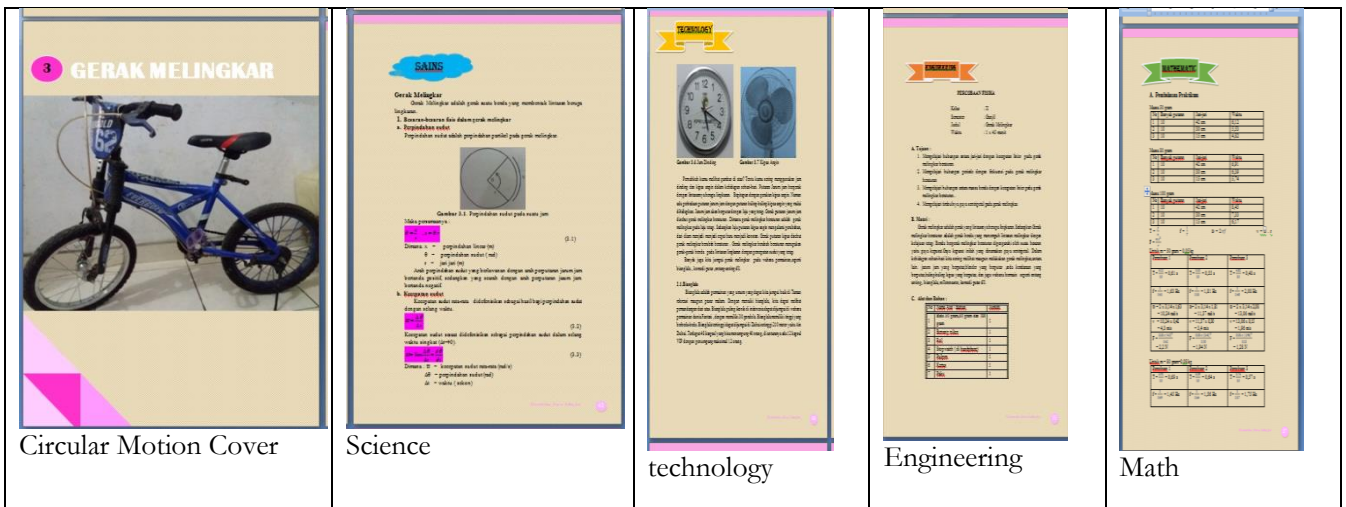


a. Cover e-book

b. Linear Motion



c. Parabolic Motion



d. Circular Motion Cover

In early product development, e-book media were evaluated by material experts and media experts

The results of the development of STEM-based e-book media are obtained, namely (1) expert evaluation data consisting of data from validation results, eligibility data and input. (2) Evaluation data of media experts consisting of validation results data, eligibility results data and input.

Expert Review of

a. Material Expert

Based on the material questionnaires validation include two aspects of materials quality and aspects of materials usefulness. Data from the validation results by material experts can be seen in the table below, which are the results of the material expert's assessment in terms of (1) material quality, obtaining a score of 23 (95, 83%) and (2) material benefit obtaining a score of 28 (87.50%) . In total, the validation level of the Physics animation video with a score of 51 (91.07%).

Table 4. Validation for material expert.

No.	Aspect	Frequency				Score	Item	Maksimum Value	Perctages
		1	2	3	4				
1	Material Quality	0	0	1	5	23	6	24	95.83%
2	Material Benefit	0	0	4	4	28	8	32	87.50%
Amount						51	14	56	91.07%



Figure 1. Validation diagram for material expert.

Based on the feasibility questionnaire by material experts including 4 aspects, namely content feasibility, presentation feasibility, language feasibility and STEM approach. Data on eligibility results by material experts can be seen in the table below, which are the results of material experts in terms of (1) content feasibility, a score was obtained 71. (88,75%) (2) Eligibility for presentation is 43 (86 %) (3) Language feasibility 55(84,61 %) (4) STEM approachmentgot (86 Overall the feasibility questionnaire obtained score 112 (86,53%).

Table 5. Eligibility for material expert.

Num.	Aspect	Frequency					Score	Item	Maksimum Value	Percentages
		1	2	3	4	5				
1	Content of Eligibility	0	0	0	9	7	71	16	80	88.75%
2	Persentation of Eligibility	0	0	1	5	4	43	10	50	86%
3	Linguistic of Eligibility	0	0	0	10	3	55	13	65	84.61%
4	The STEM Approach	0	0	2	3	5	43	10	50	86%
Amount						212	49	245	86.53%	

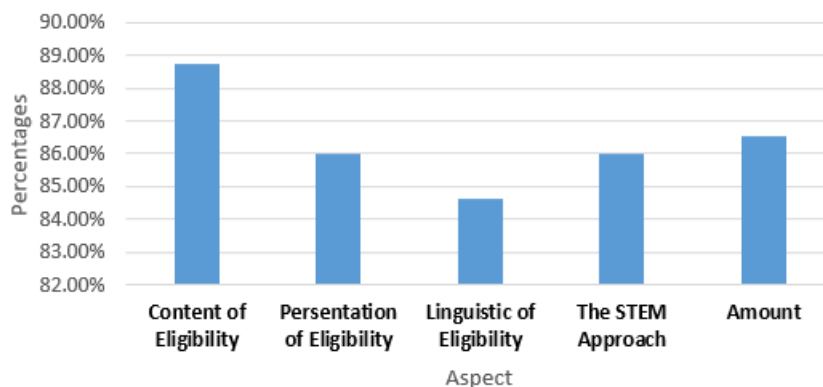


Figure 2. Feasibility diagram for material expert.

**b. Media Expert**

So this STEM-based e-book is valid with a high category and is very suitable for use. The material expert's advice for this video is to add questions to each material, then Engineering should be able to make experiments that students can do. b) Expert Overview of Media Validation by media experts includes three aspects, namely aspects of media quality, aspects of language use, aspects of media layout. The results of the media expert in terms of: (1) size, get a score of 6 (75.00%), (2) the use of language gets a score of 23 (83.3%), (83%). In total, the level of material validation obtained a score of 104 (79.81%). Look at the table below:

Table 6. Validation for media expert.

Num	Aspect	Frequency				Score	Item	Maksimum Value	Percentages
		1	2	3	4				
1	Size	0	0	2	0	6	2	8	75.00%
2	Cover Design	0	0	5	2	23	7	28	82.14%
3	Content Design	0	0	14	3	54	17	68	79%
<b>Amount</b>						<b>83</b>	<b>26</b>	<b>104</b>	<b>79.81%</b>

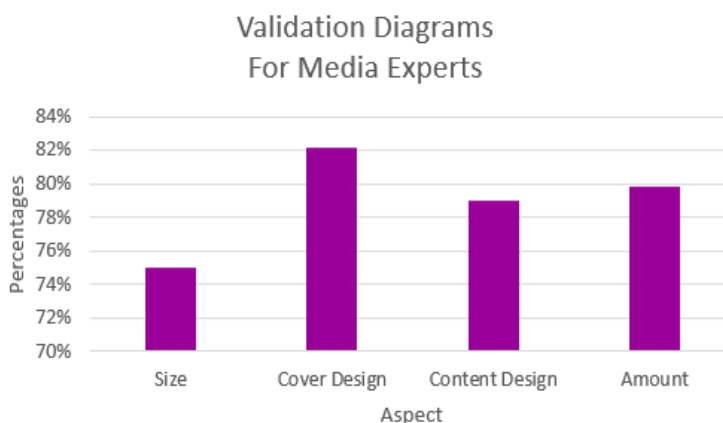


Figure 3. Validation diagrams for media expert.

The media feasibility questionnaire includes two aspects, namely (1) the design gets a score of 19 (79.17%), (2) means (83.33%). In total, the level of material validation obtained a score of 29 (80.56%). Look at the table below:

Table 7. Eligibility for media experts

Num	Aspect	Frequency				Score	Item	Maksimum Value	Percentages
		1	2	3	4				
1	Design	0	0	5	1	19	6	24	79.17%
2	Ease of Operation	0	0	2	1	10	3	12	83.33%
<b>Amount</b>						29	9	36	80.56%

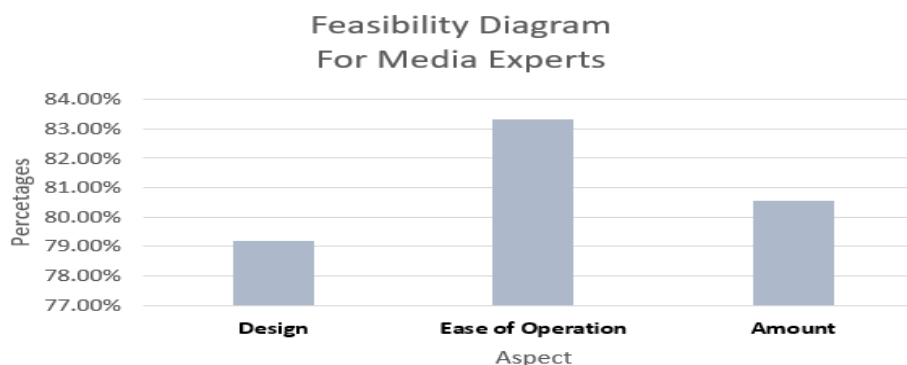


Figure 4. Feasibility diagram for media experts.

Thus the STEM-based e-book media is valid with a high category and is very suitable for use. Based on the results of the media expert's order, there are suggestions given for indicators, namely by proving which charts are straight. Revise the STEM-based e-book media according to suggestions and comments given by material experts and media experts.

4. Initial Field Trials.

This e-book media was tested on 20 students of class XI SMA Dharma Pancasila who had studied the Kinematics material. After students open the e-book media, then the response is to give a response (response) by filling out the student response questionnaire. The responses to this questionnaire consisted of 22 questions. The trial results were viewed from the following aspects: (1) appearance, obtained a score of 681 (77.39%), (2) quality, obtained a score of 123 (76.88%), (3) benefit, obtained a score of 553 (76%). Overall, the student response service to the video was 1764 (76.93%). Based on the scale table the eligibility criteria fall into the very feasible category.

Table 8. Responsibilities of small group XI SMA Dharma Pancasila

Num	Aspect	Frequency				Score	Items	Maksimum Value	Percentages
		1	2	3	4				
1	View	1	10	176	33	681	220	880	77.39%
2	Quality	0	4	29	7	123	40	160	76.88%
3	Benefit	0	14	143	24	553	181	724	76%
<b>Amount</b>						1357	441	1764	76.93%



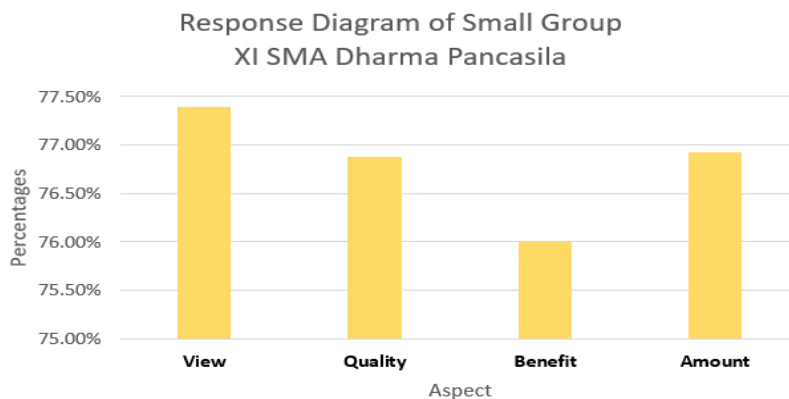


Figure 5. Response diagram of small group XI SMA Dharma Pancasila.

5. Revise the main product

After conducting product trials, the results of data analysis show that e-book media is in the very suitable category for use. Uji coba lapangan utama

6. The main field trials, test the product in large groups and teachers, and test the effectiveness of the media.

The main field trials were carried out on students from 3 (three) schools with 3 (three) teachers. After going through validation and revision, the STEM-based e-book media was tried out on small groups, namely students of class X from SMA Dharma Pancasila, SMA Wathaniyah and SMA Muhammadiyah 1. After the students understood the e-book media then the students gave their responses (response) with "questionnaire response". The responses to this questionnaire consisted of 22 questions. The test results of SMA Dharma Pancasila in terms of: (1) appearance, obtained a score of 887 (73.82%), (2) the quality of the material, obtained a score of 153 (70.83%), (3) benefit, obtained a score of 595 (67 %). Overall, the student response service to the animated video was 2380 (70.84%).

Table 9. Responsibilities of big group X SMA Dharma Pancasila

Num	Aspect	Frequency				Score	Items	Maksimum Value	Percentages
		1	2	3	4				
1	View	1	55	198	43	877	297	1188	73.82%
2	Quality	1	15	30	8	153	54	216	70.83%
3	Benefit	3	84	143	14	656	244	976	67%
<b>Amount</b>						<b>1686</b>	<b>595</b>	<b>2380</b>	<b>70.84%</b>

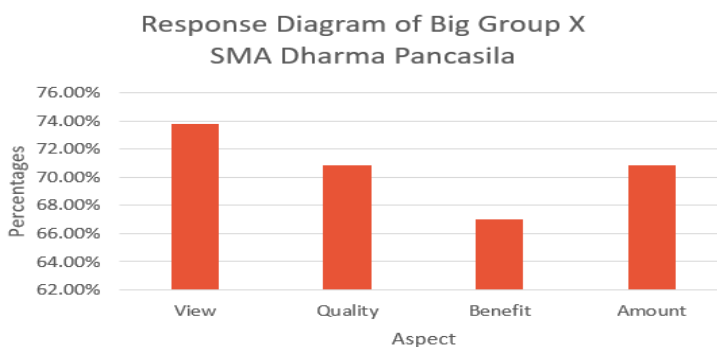


Figure 6. Response diagram of big group X SMA Dharma Pancasila

The results of the SMA Wathaniyah trial with 31 respondents in terms of: (1) appearance, got a score of 1222 (88.80%), (2) benefit, got a score of 1208 (89%). In total the students' responses to the e-book media were 2430 (88.90%). Based on the scale table the eligibility criteria fall into the very feasible category.

Table 10. Responsibilities of small group X SMA Wathaniya

Num	Aspect	Frequency				Score	Items	Maksimum Value	Percentages
		1	2	3	4				
1	View	0	0	154	190	1222	344	1376	88.80%
2	Benefit	0	0	148	191	1208	339	1356	89%
<b>Amount</b>						<b>2430</b>	<b>683</b>	<b>2732</b>	<b>88.90%</b>

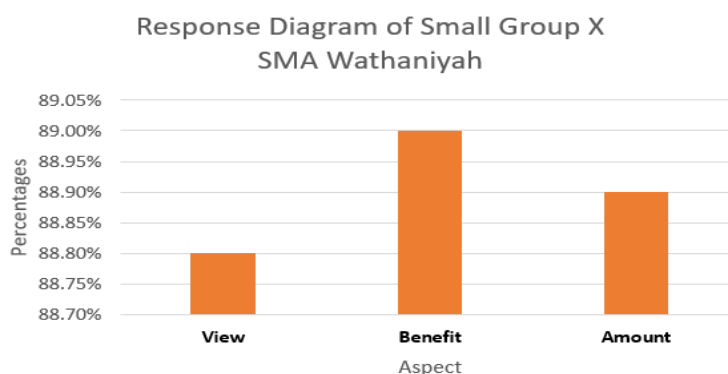


Figure 7. Response diagram of small group X SMA Wathaniyah.

Furthermore, for the third school is SMA Muhammadiyah 1 Results of the trial results in terms of: (1) appearance, obtained a score of 984 (76.64%), (2) quality of the material, obtained a score of 169 (72.84%), (3) benefit, obtained a score of 742 (71%). In total, the students' responses to the e-book media were 1895 (74.14%). Based on the scale table the eligibility criteria are included in the feasible category.

Table 11. Responsibilities of large group X SMA Muhammadiyah.

Num	Aspect	Frequency				Score	Items	Maksimum Value	Percentages
		1	2	3	4				
1	View	3	37	217	64	984	321	1284	76.64%
2	Quality	2	9	39	8	169	58	232	72.84%
3	Benefit	4	57	175	25	742	260	1040	71%
<b>Amount</b>						<b>1895</b>	<b>639</b>	<b>2556</b>	<b>74.14%</b>

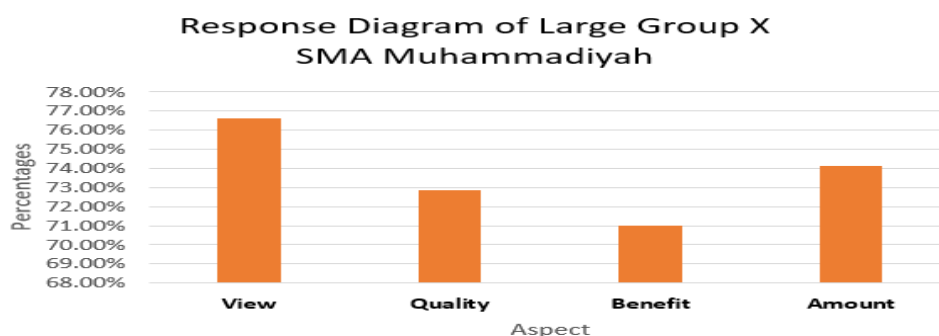


Figure 8. Response diagram of large group X SMA Muhammadiyah

After being revised by experts, this animated video was tried out for physics teachers from three Dharma Pancasila, Wathaniyah and Muhammadiyah 1 high schools. After the teacher saw the e-book media then filled out a response questionnaire. The response questionnaire for this teacher consisted of 24 statement items which included aspects of the appearance, quality and usefulness of the material from the animated video. For Pancasila Senior High School the results of the trial were reviewed from the following aspects: (1) material benefits, got a score of 22 (78.57%), (2) completeness material got a score of 18 (90%). The average score of the teacher's response to the use of video was 83.33%. Based on the scale table the eligibility criteria are very category. The teacher's comment on this animated video is that this media really helps the teacher in conveying regional material so it is very feasible to apply. The teacher's suggestion is that there are still some students who do not understand the concepts, moreover some of them have never seen what the STEM approach is.

Table 12. Responsibilities of Dharma Pancasila High School teachers

Num	Aspect	Frequency				Score	Items	Maksium Value	Percentages
		1	2	3	4				
1	Material Benefit	0	0	6	1	22	7	28	78.57%
2	Completeness of Material	0	0	2	3	18	5	20	90.00%
<b>Amount</b>						<b>40</b>	<b>12</b>	<b>48</b>	<b>83.33%</b>

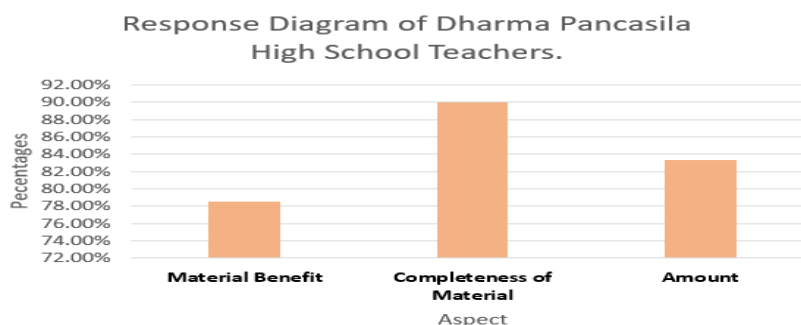


Figure 9. Response diagram of Dharma Pancasila High School teachers.

The results of the Wathaniyah high school teacher trial were viewed from the following aspects: (1) material benefits, got a score of 25 (89.29%), (2) completeness material got a score of 26 (92.86%). The mean score of the teacher's response to the use of video was 51 (91.07%). Based on the scale table the eligibility criteria are very feasible category.

Table 13. Responsibilities of Wathaniyah High School teachers

Num	Aspect	Frequency				Score	Items	Maksimum Value	Percentages
		1	2	3	4				
1	Material Benefit	0	0	3	4	25	7	28	89.29%
2	Completeness of Material	0	0	2	5	26	7	28	92.86%
<b>Amount</b>						<b>51</b>	<b>14</b>	<b>56</b>	<b>91.07%</b>

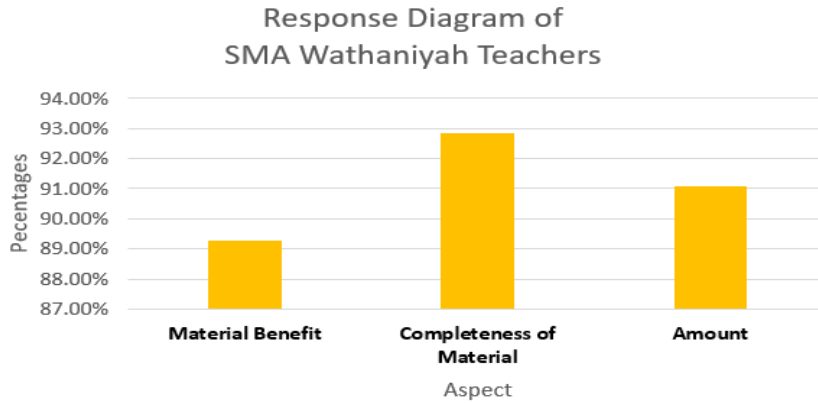


Figure 10. Response diagram of SMA Wathaniyah teachers.

The results of the SMA Muhammadiyah 1 teacher trial were reviewed from the following aspects: (1) material benefit, obtained a score of 26 (92.86%), (2) completeness material obtained a score of 32 (100%). The average score of the teacher's response to the use of video was 58 (96.67%). Based on the scale table the eligibility criteria are very feasible category.

Table14. Teacher response in SMA Muhammadiyah 1

Num	Aspect	Frequency				Score	Items	Maksimum Value	Percentages
		1	2	3	4				
1	Material Benefit	0	0	2	5	26	7	28	92.86%
2	Completeness of Material	0	0	0	8	32	8	32	100.00%
<b>Amount</b>						<b>58</b>	<b>15</b>	<b>60</b>	<b>96.67%</b>

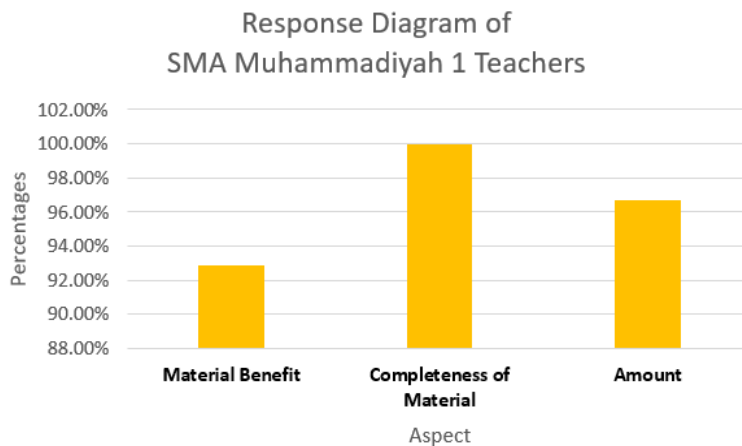


Figure 11. Response diagram of SMA Muhammadiyah 1 Teachers

In the main field trial, the effectiveness of e-book media was tested for class X students at SMA Dharma Pancasila, SMA Wathaniyah and SMA Muhammadiyah 1. From the data processing of the research conducted there was an average learning outcome obtained from the pretest and posttest scores.

- a. The results of the test of SMA Dharma Pancasila students with an average pretest score of 38.9 and an average posttest score of 64.1. After conducting the effectiveness test, it was found that the STEM-based e-book media using the kvisoft flipbook maker on kinematics material resulted in good category effectiveness.

- b. SMA Wathaniyah with an average pretest score of 37.09 and an average number of posttest scores is 60.65. After conducting the effectiveness test, it was found that the STEM-based e-book media using the kvisoft flipbook maker on kinematics material resulted in good categories.
- c. The test results of SMA Muhammadiyah 1 students with an average pretest score of 56.2 and an average posttest score of 66.5. After conducting the effectiveness test, it was found that the STEM-based media used the kvisoft flipbook maker in a good category

## 7. Main Product revision.

This research was carried out to the 7th stage. Then the results / products are in the form of STEM-based e-book media. The results of this study are in accordance with (Suryani and Sukarmi, Rosida et al, Adawiyah et al, Suyatna, A., et al) that students who use interactive e-books get higher learning outcomes.

## Discussion

The results showed that the e-book media was valid, effective and very suitable for use. In this study, the learning media developed were e-book media based on STEM assisted by the kvisoft flipbook maker on Kinematics material. The development model uses Research and Development (R&D) from Borg and Gall up to stage 7. This e-book media is designed so that students can understand physics subjects in Kinematics material. STEM-based electronic media book on electrical kinematics consists of 3 chapters. The first chapter deals with straight motion, the second is parabolic motion while the third is circular motion. Everyone has a learning goal. The learning objectives of Kinematics in this e-book media are (a) Students are able to explain regular straight motion (GLB), (b) students are able to provide examples of phenomena related to GLB in everyday life, (c) students are able to explain about straight change in regular motion (GLBB), (d) students are able to provide examples of phenomena related to GLBB in everyday life, (e) Students can know the amount of velocity and velocity in a parabolic motion using a vector, Students can understand tangential acceleration and centripetal acceleration in circular motion, students can define angular velocity, angle of acceleration, linear velocity and centripetal velocity, (h) students are able to understand the relationship between wheels, (i) students are able to explain regular circular motion and circular motion changes regularly, (j) students can give examples of regular circular motion and circular motion changes regularly.

E-book media produced on a laptop with the Kvisoft flipbook maker application, to make a book display or other teaching material become an electronic book. This STEM-based e-book media is made into several formats such as pdf, html, mp4 and exe. At this time learning has turned to be bold, so many schools are using LMS (Learning Management System) such as schoology, edmodo, google classroom, etc. This e-book media is based on the STEM approach. By using the STEM approach, students can understand physics, especially in Kinematics, even though they are independent and it is hoped that students can help self-skills, such as problem solving skills and the ability to carry out investigations, parabolic motion and circular motion. The STEM approach is (a) Science, which identifies scientific information, (b) technology, skills to use various technologies, (c) techniques, ability to develop technology with more creative and innovative designs, (d) mathematics, ability to analyze problems mathematics in its application.

The STEM approach to kinematics material with straight motion sub-material is as follows: (1) Science, understanding and formulas of straight motion, such as movement, speed, acceleration, etc. (2) Technology, examples in everyday life such as, two cars passing on the highway, the fast N700S in Japan, and the Skydiving Attractions in the Field. (3) Engineering, conducts an experiment to take over the regular straight motion (GLB) of an object with a ticker timer and an experiment in a straight situation changing regularly (GLBB) of an object with a ticker timer. (4) Mathematics, example questions to calculate the average velocity, final velocity, acceleration of objects and the maximum height of objects when thrown vertically.

The STEM approach to kinematics material with sub-material of parabolic motion is as follows: (1) Science, understanding and formulas of parabolic motion such as formulation of motion of objects on the y-axis and motion of objects on the x-axis. (2) Examples, such as, a man kicking a ball, children playing basketball, putting down a golf ball, moving a missile that was released by a fighter plane, dropping objects into a ravine, and a cannon. (3) Technique, students can do parabolic physics experiments on marbles. (4) Mathematical calculations from the

experimental results of parabolic motion on marbles such as elevation angle, maximum distance, maximum height and maximum time.

The STEM approach to kinematics material with circular sub-material is as follows: (1) Science, the definition and formulas of circular such as angular displacement, angular velocity, angular acceleration, period, frequency, angular and tangential velocity, centripetal acceleration and centripetal force. (2) Technology, for example, such as motion on a clock, fan, Ferris wheel, carousel, earring, windmill, Eurocopter X3 helicopter motion, blender and wheel motion on a bicycle. (3) Engineering, circular physics experiment experiments. (4) Mathematical calculations from the experimental results of circular motion such as linear velocity, period, frequency, and centripetal force.

After the STEM-based e-book is created, it will be validated by material experts and media experts. The validity assessment is measured based on the validation results of material experts with a score of 51 with a proportion of 91.07% and media experts showing a score of 103 and the proportion is 88.79%. Thus classified as very valid criteria. In addition to the validity questionnaire, the experts were also given a feasibility agenda. The scores and proportion of eligibility for material experts were 212 and 86.53%, while the scores and proportions of eligibility for media experts were 29 and 80.56%. After the expert said, the e-book media was revised according to the suggestions and comments of the experts. Furthermore, the e-book media were given to the initial field or small groups, namely students of class XI SMA Dharma Pancasila. The results of the responses were in the form of scores and the proportion of students in the small group, namely 1764 with 76.93%. Based on the scale table the eligibility criteria are very feasible category. Then the e-book media was revised. Furthermore, the main field trials were carried out on students from 3 (three) schools with 3 (three) teachers in the form of large group students. The percentage of response scores from the main field group trial reviewers came from three schools, namely SMA Dharma Pancasila 70.84%, SMA Wathaniyah 88.90% and SMA Muhammadiyah 74.14%. The percentage of response scores from teacher reviewers from three Dharma Pancasila SMA, Wathaniyah High School, and Muhammadiyah 1 High School were 83.33%, 91.07% and 96.67%. The level of effectiveness seen from the pretest and posttest scores of class X students who came from three schools, namely SMA Dharma Pancasila with a score of 38.9 post 64.1%. SMA Wathaniyah pretest 37.09 posttest 60.65% and SMA Muhammadiyah 1 56.2 posttest 66.5%. Based on the results of decisions and responses obtained from questionnaires and tests, a product in the form of STEM-based e-book media assisted by the Kvisoft Flipbook Maker is suitable for use and development.

### Conclusion

The conclusion of this study is that e-book media is classified as valid, effective and very suitable for use, with the following details: (1) The results of the validation of material experts and media experts on e-book media show valid criteria. (2) Effectiveness is seen from the pretest and posttest scores of the kinematics material of students from three schools, namely Pretest SMA Dharma Pancasila Pretest 38.9 while Posttest 60.5. Pretest SMA Wathaniyah 37.09, while Posttest 60.65 and SMA Muhammadiyah 56.3 pretest and posttest 66.5, so the design of STEM-based e-book media is effective with good categories. (3) It is very feasible to use, according to the results of the feasibility questionnaire for material experts and media experts, small group respondents, teachers and large group respondents from three schools.

### Suggestion

Suggestions from this research are: (1) For other researchers to make e-book media using several formats by using other applications. (2) In order to carry out this research at the university for students.

### Acknowledgements

The author would like to thank profusely: (1) LPPM University of Medan as a grant funder, (2) Mrs Dean, as superior at the Faculty of Mathematics and natural Sciences, (3) Head of department as superior at physics major, (4) The principal who has given permission to the researcher, to conduct research at school, (5) to teachers who have helped researchers during the field trials (research).

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