

---

**PHYSICS LEARNING MEDIA USING ADOBE FLASH CS6 TO REMEDIATE  
STUDENTS' MISCONCEPTIONS ON NEWTON'S LAW MATERIALS**

Arif Wiratama

Universitas Islam Negeri Sulthan Thaha Saifuddin, Jambi, Indonesia

Corresponding author email: [arifwiratama@uinjambi.ac.id](mailto:arifwiratama@uinjambi.ac.id)

---

**Submit: 27 November 2022**

**Accepted: 14 Desember 2022**

**Publish: 30 Desember 2022**

---

**Abstract**

This research aims to determine the feasibility of developing, theoretical, practical, and effectiveness of interactive multimedia on Newton's law material. This research was motivated by frequent misconceptions, physics learning difficulties, and students' needs for an interesting instructional media. This development research used the ADDIE model development design. Data collection techniques used questionnaires and multiple-choice questions. Data analysis techniques used in research and development were qualitative and quantitative. Qualitative was used to describe data in the form of comments and suggestions for improvement from validators, teachers, and students. While quantitative was used to process data in the form of scores from research by teachers and students as well as to process the effectiveness test results data. Based on the results of the validation of multimedia development by instructional material and media experts, declared valid and able to be tested, while the results of the teacher's response obtained a percentage of 87.14% in the excellent category, the results of student responses in the one-on-one trial obtained a percentage of 94% in the very good category, the results of student responses in small group trials obtained a percentage of 90.1% in the excellent category, and the results of the effectiveness of students experiencing misconceptions ranged between 12.5% and 37.5% as much as 1 person to 3 students. So it can be concluded that learning outcomes using multimedia can improve student understanding of concepts.

**Keywords:** Newton's Law; Learning Media; Remediation of Misconceptions;

**Abstrak**

Penelitian ini bertujuan untuk mengetahui kelayakan pengembangan, teoritis, praktis serta keefektifan multimedia interaktif pada materi hukum newton. Penelitian ini dilatar belakangi dengan sering dijumpai terjadinya miskonsepsi, kesulitan belajar fisika, dan kebutuhan siswa akan sebuah media pembelajaran yang menarik. Penelitian pengembangan ini menggunakan desain pengembangan model ADDIE. Teknik pengumpulan data menggunakan angket dan soal pilihan ganda. Teknik analisis data yang digunakan dalam penelitian dan pengembangan yaitu kualitatif untuk mendeskripsikan data berupa komentar dan saran perbaikan dari validator, guru dan siswa sedangkan kuantitatif untuk mengolah data dalam bentuk skor dari penelitian oleh guru dan siswa serta untuk mengolah data hasil uji efektifitas. Berdasarkan hasil validasi terhadap pengembangan multimedia oleh ahli materi dan ahli media dinyatakan valid dan dapat diujicobakan, sedangkan hasil respon guru diperoleh persentase 87,14% dalam kategori sangat baik, hasil respon siswa pada ujicoba satu-satu diperoleh persentase 94% dalam kategori sangat baik, hasil respon siswa pada ujicoba kelompok kecil diperoleh persentase 90,1% dalam kategori sangat baik dan hasil ujicoba efektifitas siswa mengalami miskonsepsi yang berjumlah berkisar antara 12,5% dan 37,5 % sebanyak 1 orang hingga 3 orang siswa. Maka dapat disimpulkan hasil belajarr menggunakan multimedia dapat meningkatkan pemahaman konsep siswa.

**Kata Kunci:** Hukum newton; Media Pembelajaran; Pengembangan; Remediasi Miskonsepsi;

---

## **Introduction**

One of the problems that are often encountered in learning physics is misconceptions. Misconceptions are differences in the interpretation of concepts that students have with the concepts of scientific theories set by experts. Suparno (2013) states in his book that misconceptions exist in all fields of science, such as physics, chemistry, biology, and earth and space. Based on several literature studies, many students experience misconceptions about physics learning, such as the concepts of mechanics, dynamics, optics, and waves, temperature and heat, electricity and magnetism, as well as modern physics and others.

Based on the results of observations, it was difficult for students to visualize, describe, or imagine a given concept. Interviews conducted with students found misconceptions about Newton's laws such as: a larger object will provide a greater force; the action reaction force occurs on the same object; and the object is at rest if the mass of the object is less than the resultant force. This needs to be followed up on misconceptions in Newton's law material by remediating. Remediation is a follow-up that is carried out when students need to strengthen a concept if they have not mastered the concept as a whole. The method used to remediate is to provide re-learning to students who experience misconceptions so that the quantity of students who experience misconceptions can be reduced and lost. Re-learning that will be carried out should be well prepared.

Wahyudi et al. (2020) developed learning media using Adobe Flash CS6 to improve students' understanding of concepts on heat and gas kinetic material in the very effective category. Referring to Andriana (2013), the implementation of remediation using flash animation on light refraction material on thin lenses is effective for overcoming students' misconceptions.

In addition, Gayatri (2018) revealed that learning media is one of the factors that contribute to the success of the learning process in schools because it can make it easier for teachers to convey information to students and vice versa. Learning media is anything that is used as an intermediary for learning between teachers and students to achieve a good learning process. Research on the development of learning media conducted by Oktaviani (2017) showed that the decrease in the number of students who experienced misconceptions in physics learning after being remedied using CSIM was greater in the experimental class, which was as large as the control class.

Ichwan (2015) explained that Adobe Flash CS6 is a software that is able to combine vector graphics and design elements into a document. Using the edit drawing tools menu available on the worksheet, users can add media from outside the application such as audio, images, and even video into a single unit whose appearance can be arranged using the timeline. Thus, from the description above, it is necessary to conduct research on the development of learning media to remediate misconceptions in students.

## **Methods**

This type of research is research and development with a development design using the ADDIE model. Development was carried out in five stages, including the analysis stage, design stage, development, implementation and evaluation stages. This research uses a mixed-methods research (MMR) approach, which is a combination of qualitative and quantitative approaches. This combined method uses a type of triangulation in which the researcher implements qualitative and quantitative methods simultaneously (collecting and analyzing data simultaneously). The types of data in this study were qualitative and quantitative. The qualitative data in this study was obtained from the distribution of questionnaires that had been carried out by the validator team to teachers and students. While quantitative data is used to analyze the questionnaire responses of teachers and students to the media using a Likert scale, as well as field trials and effectiveness tests.

The subjects of this study were 30 students in class X IPA at SMA Negeri 10 Merangin. Researchers chose MIA-1 research subjects from class X who had low learning activities and learning outcomes. The selection of research subjects using the purposive sampling technique is based on considerations that focus on research objectives. The design stage begin after the analysis stage was evaluated and conclusions were drawn to develop interactive multimedia by starting with determining the development schedule, material structure, media specifications, making flowcharts and storyboards, and preparing assessment instruments.

The development stage began with collecting text, video, animation, and several other things related to media content; developing learning media; validating designs, materials, and media experts so that interactive multimedia products are obtained.

The implementation phase began with a trial for subject teachers, and then continues with a one-on-one trial conducted on grade X students supervised by the developer and subject teacher. While small group trials were conducted on eight students, and field trials were conducted on eight students who were randomly selected using interactive learning media that had been developed. The evaluation stage was carried out at the end of each previous stage, as well as the final evaluation. The instruments used are validity test questionnaires, response questionnaires, student response questionnaires, and effectiveness sheets.

## **Results and Discussion**

The results of the development of this research include; (1) an interactive multimedia with Newton's Law material; (2) assessment of design, media, and learning materials on the development of interactive multimedia carried out by design experts, media experts, and material experts; (3) assessment of all respondents consisting of one-on-one trials and small group trials and teacher responses to multimedia; and (4) the results of the effectiveness test of interactive multimedia that has been carried out using the experimental one-group pretest-posttest design method.

### **1. Analysis Stage**

At this stage, an analysis of teacher needs, student characteristics, learning materials and the learning environment was carried out. It was found the problem of the lack of use of learning media in learning physics at SMAN 10 Merangin, so it was necessary to develop learning multimedia. In addition, there were also misconceptions experienced by students in learning physics about Newton's laws.

### **2. Design Stage**

This stage was carried out to design learning media and appropriate testing methods. What was done at this stage was to determine the development schedule. Furthermore, the structure of the material in this study is Newton's Law material. The product that developed in this research is interactive multimedia on Newton's Law material. This media development used Adobe Flash CS6, which was able to combine text, video/animation, and images into one learning medium, simplifying understanding in the media so that it is easier for students to understand learning. This medium displays a real picture in everyday life so that students more easily connect learning with experiences experienced. Finally, the media contains interactive practice questions using a four-tier-test design. Furthermore, flowcharts and story boards were made according to the multimedia created. In addition, making validation instruments for design, material, and media experts in the form of questionnaires for teacher and student responses.

### **3. Development Stage**

In this development stage, materials were collected to create interactive multimedia using Adobe Flash Professional CS6 in the form of videos, animations, images, and others. Furthermore, validation with material experts was carried out twice, with several suggestions and improvements, so that it was declared valid and could be tested. Then it was continued with validation with media experts, which was carried out twice with some suggestions and improvements, so that it was declared valid and could be tested. After validation and revision are declared valid by experts, the multimedia product is feasible for field trials.

### **4. Implementation Stage**

The trial was conducted on the tenth graders of SMAN 10 Merangin. During the trial, the researcher was assisted by a physics subject teacher. The implementation phase in this study consisted of three (3) stages, namely teacher response, one-on-one trials, and small group trials.

The first stage was carried out to determine the teacher's response to the developed learning media. The developer distributed a questionnaire to two Physics subject teachers who teach in class X. From the assessment given by the teacher, it was analyzed and calculated the agreement about the media that was made. The results of the teacher's response regarding the developed multimedia can be seen in Figure 1 below:

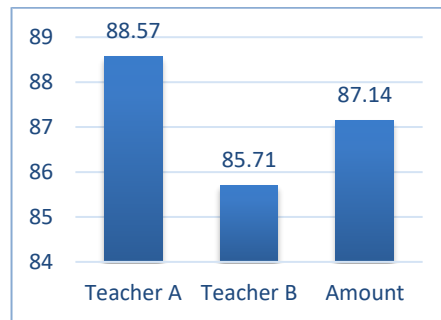


Figure 1. Teacher Response Result Diagram

Based on the diagram in Figure 1, it can be concluded that the interactive multimedia development gets a total percentage of teacher A's response of 88.57% and teacher B's response of 85.71%, so the average is 87.14% in the very good category.

One-on-one trials were carried out on three students as respondents, from the assessment given and then analyzed and calculated the agreement about the media that was made. The results of student responses to multimedia development can be seen in the diagram Figure 2:

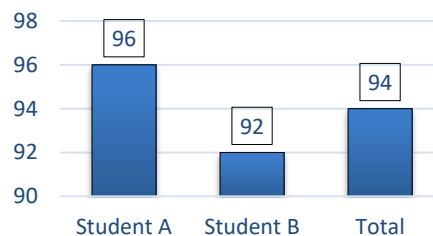


Figure 2. One-on-one test results

Based on the diagram, it can be concluded that the development of learning media gets a total percentage of one-on-one test responses of 94% in the very good category, where the total percentage of student A is 96% and student B is 92%, all of which are in the very good category.

Small group trials were carried out on 8 students as respondents, from the assessment given and then analyzed and calculated agreement about the media that was made. The results of student responses to multimedia development can be seen in the diagram Figure 3 as follows:

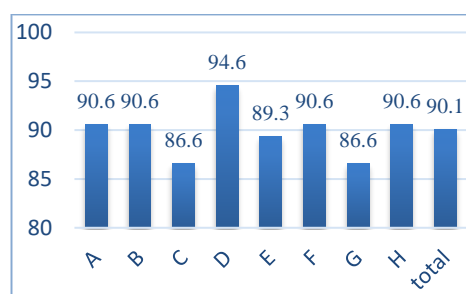


Figure 3. Diagram small group trials results

Based on the diagram in Figure 3, it can be concluded that the development of learning media gets a total percentage of small group test responses of 90.1% in the very good category, while the total percentage of all students in the good category.

The effectiveness test (field trial) was carried out by looking at the learning outcomes test. A learning outcomes test is used to determine the effectiveness of the learning process using interactive multimedia. The effectiveness test was carried out on eight students by giving a pretest using a four-tier-test diagnostic test. Maison, Safitri, Wardana (2019), adapting the four-tier-test instrument from Jubaedah et al. (2017), says (1) the first level is multiple choice questions and answers; the second level is the level of confidence in the answers; the second level is the level of confidence in the answers; the second level is the level of confidence in the answers; and the second level is the level of confidence in the answers. Three in the form of reasons for the answers given, and the fourth is the

level of confidence in the reasons. Analysis of the data to identify misconceptions using a misconception analysis table guide (Gurel et al., 2015) in Maison, Safitri, and Wardana (2019) as shown in Table 1.

Table 1 Identification of Misconceptions

Answer	Confidence	Reason	Confidence	Description
B	Y	B	Y	Understand the concept
B	TY	B	TY	No understand the concept
B	Y	S	Y	False positif
S	Y	B	Y	False negative
S	Y	B	Y	Misconception
S	S	S	S	Error

Description; B (Correct Answer), Y (Convinced), TY (No Convinced), dan S (Wrong Answer).

The results of the pretest that have been carried out obtained results at each level as shown in Table 2.

Table 2. Pretest Results per level

	Tier 1	Tier 1 & 3	All Tier
M1	75	56	38
M2	75	50	19
M3	63	13	0
M4	100	88	50
M5	88	38	25
M6	88	63	50
M7	88	50	25
M8	63	25	13
M9	100	63	63
Amount	82	49	31

Based on the table above, it was obtained that M1 (misconception1) in tier 1 was 75% of the two item questions. Students assume that objects of small mass are attracted by the earth. But these objects will not attract the earth. In theory, according to Abdullah (2016), reveals the existence of a reaction force equal to the action force but in the opposite direction. If the first object exerts a force on the second object (action force), then the second object will exert an equal force on the first object but in the opposite direction (reaction force).

In item number 6, the fifth identification of misconceptions (M5), students who answered according to the misconception answer key were 88%. Students understand the concept of "an object at rest means it has a greater frictional force than an external force." According to the theory of friction, force has the same magnitude as the force exerted from the outside. While M4 students understand that the resultant force on an object is equal to zero, the object must be at rest on the grounds that there is no force that can make the object move. The results of the misconceptions for each tier are shown in the figure below.

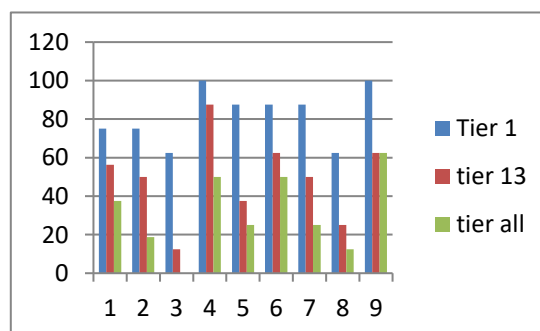


Figure 4. Pretest results per level

From the picture above, it can be concluded that the highest level of misconception is in tier 1. This is because in tier 1, it is only seen from student answers, such as ordinary multiple-choice questions. However, it cannot be said that students have complete misconceptions. There are two

possibilities for the answers given by the students. First, the students answered correctly because they had misconceptions. Second, students answered correctly because they only guessed the answer.

The misconception score at the first and third levels is lower than the first level. Because, at the first and third levels, the scoring is assessed from tiers 1 and 3, namely, students' answers and reasons. The lowest misconception scores are found at all levels, because the scoring is assessed from the answers, reasons, and the level of student confidence in the answers and reasons, according to the statement of Maison, Lestari, and Widaningtyas (2020).

Furthermore, an assessment is carried out on all tiers, which is calculated based on students' answers to all tiers. According to Maison, Lestari, and Widaningtyas in *Identifying Student Misconceptions on Business and Energy Materials* (2020) Assessment on Tiers 1 and 3, if the answers to tiers 1 and 3 are correct (according to the answer key), a score of 1. All tiers are seen from the answers, the level of confidence in the answers, the reasons, and the level of confidence in the reasons. If all are in accordance with the answer key, the score is 1. On the other hand, if one of them is zero, the score is equal to zero.

The next step is to provide learning by using learning media that have been developed and finally doing a posttest. The results of the posttest misconceptions that occur in students are shown in Table 3 below.

	Tier 1	Tier 1 & 3	All Tier
M1	0	0	0
M2	6,3	6,3	6,3
M3	0	0	0
M4	13	13	13
M5	31	6,3	6,3
M6	19	13	13
M7	0	0	0
M8	13	0	0
M9	13	0	0
Amount	10,42	4,167	4,167

From the posttest results, it appears that all students have started to understand Newton's law concepts well. Misconceptions were highest in the post-test on misconceptions (M5). The first level in M5 is in item number 6 as much as 31%. Five students answered according to the first answer key and one student answered according to the second answer key. At the first and third tiers, 6.3% and 6.3% for all levels.

Then on M6, the misconception score at the first level is 19%, the first and third levels are 13%, and for all levels it is 13%. The sixth misconception (M6) is found in items number 7 and number 9. In question number 7, the first, first and third levels, and all levels, none of the students experienced misconceptions. However, on item number 9, 3 students answered according to the answer key at the first level, 2 people at the first and third levels, and 1 person for all levels. The average percentage of misconceptions obtained at level 1 is 10.4%, levels 1 and 3 are 4.17, and 4.17% at all levels.

The final result shows that there are still students who experience misconceptions. This can be due to the lack of students in observing the questions asked or the media developed in the application of the material still have weaknesses and shortcomings. Overall, it was observed that the percentage comparison between the pre-test and post-test showed a significant decrease in misconceptions as shown in the figure below.

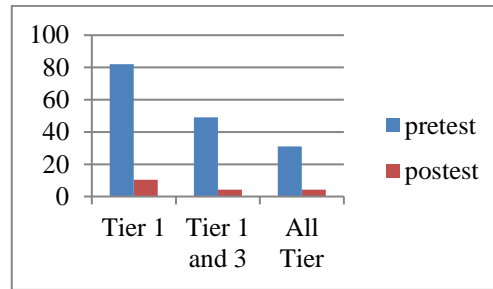
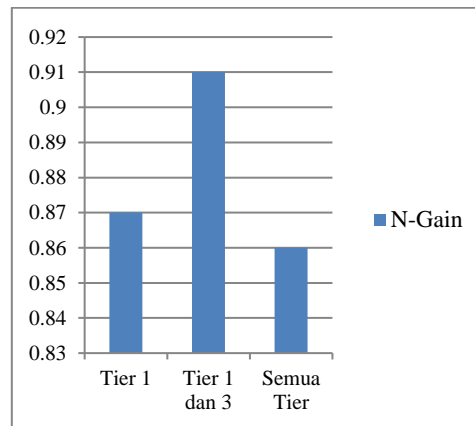


figure 5. Diagram Comparison of pretest and posttest

Based on Figure 5.5, it can be seen that there was a decrease in the percentage of misconceptions between the pretest and posttest. The first level was a decrease in misconceptions from 82% to 10.4%. At the first and third levels, the pretest percentage decreased from 49% to 4.17% at the posttest. Finally, for all levels, the decrease in misconceptions from the pretest was 31% to 4.17%. Then calculate the effectiveness using the N-Gain equation. The results of the N-Gain calculation are interpreted using Hake's classification in Table 4.

Table 4. Classification <i>N-Gain</i>	
Value Of <i>N-Gain</i>	Category
$g > 0,7$	High
$0,3 < g \leq 0,7$	Medium
$g \leq 0,3$	Low

The calculation of N-gain per level is obtained as shown below.



The picture above describes the N-Gain value in each tier greater than 0.7. At the first level, the N-Gain value is 0.87, the first and third levels are 0.91, and the results of all levels are 0.86. It can be concluded that the developed learning media effectively remediates students' misconceptions of Newton's law material.

## Conclusion

Based on the results of the validation of interactive multimedia on electrical materials for class X high school students, it was found that the feasibility of the product was carried out by an expert validator and from the results of the product validation it was declared feasible to use. The second stage was that the product was tested on two subject teachers to ask for an assessment of the product developed, so the teacher's assessment results are 87.14% in the very good category. Then, a trial to students was conducted, namely a one-on-one trial that obtained a feasibility value of 94% and a small group trial with a feasibility value of 90.1%, which means that interactive multimedia Newton's law

material is very good and feasible to use. Field trials were carried out by conducting a pretest before carrying out learning activities. Then give a posttest to students after doing the learning with the media. The results obtained showed a decrease in students' misconceptions at all levels of 0.86. So it is stated that the media is in the category of high effectiveness in remediating students' misconceptions of Newton's law material.

### Referensi

- Aswirna, P., Wahyudi, W., Hurriyah, H., & Amalina, A. (2020). Pengembangan Media Pembelajaran Berbasis Aplikasi Adobe Flash Pada Materi Kalor, Perpindahan Kalor Serta Teori Kinetik Gas untuk Meningkatkan Pemahaman Konsep Siswa. *NATURAL SCIENCE: Jurnal Penelitian Bidang IPA dan Pendidikan IPA*, 6(1), 66-80.
- Gayatri, T., Soegiyanto, H., & Rintayati, P. (2018, April). Development of Contextual Teaching Learning-Based Audio Visual Adobe Flash Media to Improve Critical Thinking Ability of Geography Learning at Senior High School. In *IOP Conference Series: Earth and Environmental Science* (Vol. 145, No. 1, p. 012004). IOP Publishing.
- Ichwan K (2015) *Membuat Media Pembelajaran dengan Adobe Flash CS6*. Yogyakarta: CV. Andi offset
- Maison, Lestari, N., Widaningtyas, A. 2020. Identifikasi Miskonsepsi Siswa pada Materi Usaha dan Energi. *Jurnal Penelitian Pendidikan IPA (JPPIPA)*. 6(1). pp. 32-39
- Oktaviani D. (2017). *Pengembangan CSIM berbasis simulasi virtual untuk penerapan model pembelajaran PDEODE berorientasi remediasi misikonsepsi siswa SMA pada materi kinematika gerak lurus* (Doctoral dissertation, Universitas Pendidikan Indonesia).
- Suparno, P. (2013). *Miskonsepsi & perubahan konsep dalam pendidikan fisika*. Gramedia Widiasarana.