

# Design of Android-Based e-Module Using Lectora Inspired by Newton Law

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**Keywords:** Android-Based e-Module, Lectora Inspire, Newton Law, Valid and Practical.

**Abstract:** This study shows that the design of an Android-based e-module using Lectora Inspire is valid and practical for learning Newton's law. The research method used is Research and Development. Its design in this study is the ADDIE development model consisting of five stages: analysis, design, development, implementation, and evaluation. The subjects of this research are experts, peers, and students. The testing procedure is carried out through validity and practicality tests. Data was collected using interview instruments and questionnaires. All data were analysed qualitatively (for interview data as well as suggestions and comments from experts, peers, and students) and quantitatively (for assessment data from experts, peers, and students using a Likert scale). The results show that the learning media in the form of an android-based e-module designed using the Lectora Inspire application on Newton's Law material is valid and practical. The conclusions related to the design of Android-based e-modules that must be considered are complete and explicit material to help students learn independently, a precise selection of type, size, and colour of letters, and the use of effective sentences so that students understand.


## 1 INTRODUCTION


Technology and information that are developing more rapidly will affect various aspects, one of which is the aspect of education. Teachers, as one the actors in the realm of education, must have the ability to utilize technology and information, by using digital technology, communication facilities, and/or appropriate networks to access, manage, evaluate, and create information that will function in the learning process (Solihudin, 2018). Those requirements are under one of the learning principles that became the basis for the development of process standards for primary and secondary education, summarized in Permendikbud Number 22 of 2016 about the use of information and communication technology to increase the efficiency and effectiveness of learning.


Physics is a part of science that studies phenomena or natural phenomena and their interactions with observable objects/matter to microscopic objects/matter. Some students find it

challenging to study physics, as research has shown that out of 120 students in 3 schools, 51% of students think physics is difficult to understand (Azizah et al., 2015). This difficulty can be caused by the many formulas and concepts that must be mastered, including Newton's law material. As the results of a preliminary study on Public High School 5 Tasikmalaya students, where 48% of students said it was challenging to apply Newton's laws in everyday life and 54% of students had difficulty describing force vectors (force directions) and determining the types of forces acting on an object.

The learning media that is used in learning Physics is a module. The module assists in determining student competency achievement in the material studied (Simamora et al., 2017). A learning module is a unit of learning activity planned and designed to assist students so that learning objectives are achieved (Fauzan, 2021). As technology continues to develop, many shifts have shifted from print-based to digital-based media. Likewise, learning modules that have transformed into

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electronic form are known as electronic modules (e-modules).

Learning modules designed in printed form tend to be more varied and attractive to students (Sidiq&Najuah, 2020). The printed learning module in question is a module that has yet to be based on digital technology. Even though digital technology is currently developing rapidly, teachers are required to utilize technology in the learning process. As for some of the existing electronic modules, they only transfer hard copies of textbooks to soft documents in doc, pdf formats, and so on (Kiruna et al., 2020).

Meanwhile, the module does not include various products such as video, audio, animation, and images that should be available in a digital technology-based module to help students understand the subject matter. Following research that learning media in the learning process has several benefits, namely (1) computer simulations in the form of animated images can strengthen and develop students' understanding of concepts, (2) mastery of the material is at a high level, (3) interactive multimedia-based learning media has been assessed theoretically feasible (Shalikhah, 2017).

One application used in developing electronic modules and inserting products in video, audio, animation, and images is the Lectora Inspire application. It is an application that provides programs for creating effective learning media. This application is also software designed for electronic learning. Lectora Inspire is considered easy to use by even teachers who are not proficient with computers because this application is specifically designed for beginners and does not require an understanding of programming languages (Irsyad, 2016).

Besides the Lectora Inspire application, Android is also an operating system that can assist in learning. Android is a popular and populist operating system because it is used in various circles (Sugiyono, 2017). Android is a complete, open, and accessible platform. A comprehensive platform means it allows programmers to develop an application with available tools, an open source tells it is free to create applications, and an accessible platform makes it easy for everyone to freely make applications without thinking about royalties that must be paid (Sidiq&Najuah, 2020).

Based on the background and development carried out by previous research, the authors are interested in developing an Android-based electronic module with the help of the Lectora Inspire application on Newton's law material. The study will also focus on producing valid and practical e-module design products established by analysing problems

and needs.

## 2 METHODOLOGY

The research method used is Research & Development (R & D), which is used to produce specific products and test the effectiveness of these products. The Research & Development method is a step that aims to develop a new product or even refine an existing product to be more effective and efficient. The Research & Development method is a unit where one stage with another stage has linkages and continuity (Sugiyono, 2017).

### 2.1 Research Stages

In this study, researchers used the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation. The stages of the ADDIE development model in the implementation of research and development (Cahyadi, 2019) and (Kurnia et al., 2019) are as follows:

- a. Analysis, at this stage, the researcher identifies the problems or gaps that occur in learning
- b. Design, at this stage, the stage of planning learning modules that are developed by compiling electronic module frameworks in the form of storyboards and flowcharts, gathering material, and inserting/making illustrative images and videos.
- c. Development, at this stage, is where electronic modules are being developed by what was planned in the previous step. Physics concept expert validators, digital media expert validators, and language expert validators then validate the electronic modules that have been developed.
- d. Implementation, at this stage, the developed products are applied to determine the practicality of the questionnaires given to students and teachers after product trials have been carried out.
- e. Evaluation is the final stage for obtaining feedback from input and suggestions from students and teachers. This evaluation stage can also be in the form of an improvement (revision) made by researchers after receiving information and recommendations from students, teachers, and validators.

## 2.2 Population and Sample

Population in the entire research subject. In this study, the population was all students of SMAN 5 Tasikmalaya class X MIPA consisting of seven classes and a total of 251 students. This population was selected due to the suitability of the target material on Newton's law for class X MIPA, and they use smartphones with the Android operating system. The sample is defined as part of the number and characteristics of the population. The sample was selected using the cluster random sampling technique, which determines samples randomly from various groups in the population (Sugiyono, 2019). The population consisted of seven groups, and one was randomly selected, so class X MIPA 7 was obtained as the research sample.

## 2.3 Data Collecting

The data collection techniques used in this study were interviews, validation tests, and questionnaires to test the practicality of the e-modules. The questionnaire follows a Likert scale which consists of four categories, as shown in Table 1.

Table 1: Categorization using a Likert scale.

Score	Explanation
4	Strongly agree/ very decent/ very good
3	Agree/ decent/ good
2	Disagree / inappropriate / not good
1	Strongly disagree/very inappropriate

Table 2: Interpreted of product validity or practicality.

Achievement Level(%)	Category
81 – 100	Highly valid/practical
61 – 80	Valid/practical
41 – 60	Quite valid/practical
21 – 40	Less valid/practical
0 – 20	Invalid/practical

The validation score obtained from the expert will then be calculated as a percentage. After getting the percentage results, then the results are interpreted based on the product validity criteria presented in Table 2.

## 3 RESEARCH RESULTS AND DISCUSSION

### 3.1 Analysis

The curriculum used in SMA Negeri 5 Tasikmalaya

is the 2013 Curriculum. This Newton's Law material refers to Core Competencies, and Basic Competencies refers to Permendikbud Number 37 of 2018. Then several indicators were compiled, including: (1) explaining Newton's Laws of motion; (2) determining the physical quantities in Newton's Laws; (3) conducting simple experiments on Newton's Laws; (4) knowing the various types of forces; (5) drawing and deciphering vectors of different types of forces acting on an object; (6) applying various types of forces acting on an object; (7) using Newton's Laws of motion in solving problems of motion of objects; and (8) applying the concepts of the Laws Newton's laws of motion in everyday life. Some material points presented in the e-module are Newton's Laws of motion, types of forces, and application of Newton's Laws.

The interviews and questionnaires show us that the teaching materials used in school are learning videos from YouTube, textbooks, and PowerPoint. The teaching material has helped students in the physics learning process, but 77% still need help learning physics. In learning Newton's Law, 54% of students still have difficulty determining the type of force and force direction acting on an object, and 48% of students have trouble applying Newton's three Laws in everyday life.

The teacher also explained that students' enthusiasm for learning was not optimal during online classes, so exciting learning media was needed. The results of the student questionnaire showed that 96% of students required teaching materials in the form of exciting learning modules in physics learning, and 92% of students needed Android-based learning modules that assisted in understanding.

Based on this analysis, an exciting and Android-based learning module is needed that helps in the learning process. Making these learning modules can be assisted by using the Lectora Inspire software, which combines various multimedia products such as images, video, audio, and text. In addition, the output of Lectora Inspire can be in the form of an HTML file converted into an Android application.

Another advantage of the Lectora Inspire software is the ease of use because Lectora Inspire does not need to use programming and provides a media library to help users. So Lectora Inspire can be used by teachers who need to be more proficient with computers. In addition, the Lectora Inspire software already provides a varied theme that can be used and provides several easy questions to apply with scores.

With the various advantages of Lectora Inspire, there is also the problem of students' difficulties and needs for learning media. The android-based

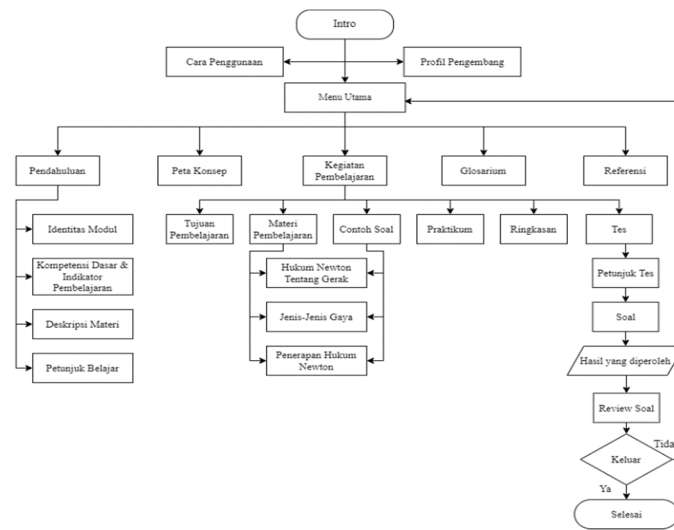


Figure 1: Flowchart of designed e-module.

e-module assisted by Lectora Inspire on Newton's Law material can be applied to students who are expected to help solve difficulties experienced and increase student enthusiasm in studying physics.

### 3.2 Design

The product design is in the form of a flowchart presented in Figure 1. The flowchart describes the workflow or process of the Newton's Law e-module that users or students can use. They start with the introduction of the e-module application as the first page of the main menu, which presents the introduction, concept maps, learning activities, a glossary, and references.

The material presented in the e-module is Newton's law material. Based on the essential competencies, Newton's Law consists of several sub-materials, including Newton's Laws of motion, types of forces, and the application of Newton's Laws. The material presented comes from a physics textbook written by Douglas C. Giancoli entitled "Physics" fifth edition volume 1, published in 2001, Paul A. Tipler entitled "Physics for Science and Engineering" third edition volume 1, published in 1998, "Physics book for SMA/MA Class X" written by Pujianto in 2016, learning module entitled "Physics: Newton's Laws of Motion" written by HerrySetiawan in 2020.

The background and several illustration images are sourced from *freepik*, which provides various photos and graphic designs for free or paid on the

internet. The sound effects embedded in the electronic module developed originate from *pixabay* (an internet site that provides hundreds of thousands of photos, music, and videos that can be freely used for free or for a fee). The researchers inserted illustrative images in the developed electronic module according to the needs. There are animated images that describe Newton's Law and become compelling characters in the e-module. The video from YouTube was inserted into the e-module, and the researchers made some videos. The buttons in the e-module are available in the Lectora Inspire software.

After collecting these materials, products are compiled and created using the Lectora Inspire software. Lectora Inspire is a software that can be used to create learning media. Lectora Inspire can combine other multimedia products such as videos, images, animations, and audio.

### 3.3 Development

This development stage includes activities for doing electronic modules with the help of Lectora Inspire and the results of expert validation. Figure 2, as shown, is a product image that was made before carrying out the validation test by an expert validator.



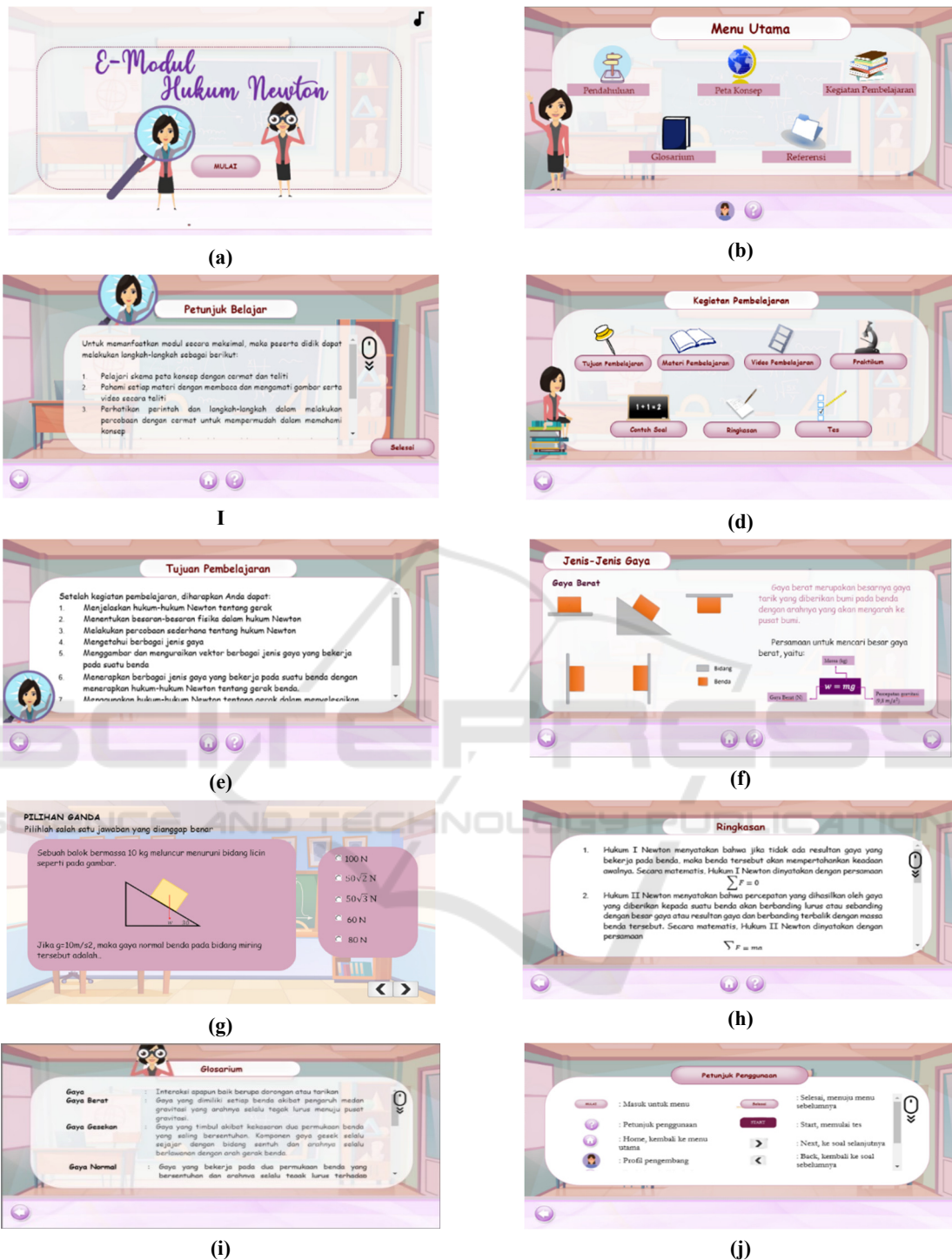


Figure 2: e-Module display, consist of (a) intro page (b) main menu(c) introduction/study guide (d) material chart (e) learning objectives (f) learning materials (g) sample questions (h) summary (i) glossary/references (j) instructions for use.

The intro page is the first or opening page for the e-module application. There is a text display on this page containing the application's name, "Newton's Law e-Module." There is a "start" button to go to the

main menu, which will work if you click that. This main menu consists of several menus, including the introduction/study guide, material chart, learning materials, glossary, and references. Through the

learning activity page, students/users can choose their activities starting from the objective learning page, learning materials, practicum learning videos, sample questions, summaries, and evaluations.

E-modules that have been designed, then carried out on validation tests by expert validators in the form of suggestions for e-modules. The validators consisted of three experts, namely material experts, media and digital experts, and linguists. With the suggestions given by the validator, improvements were made to the product being developed.

### 3.3.1 Physics Content Validator

Physics content expert validation was carried out to assess the learning material. The validator suggests using operational active verbs for practical purposes, from knowing to showing, based on verbs on cognitive and psychomotor assessment. These improvements can be seen in Figure 3.

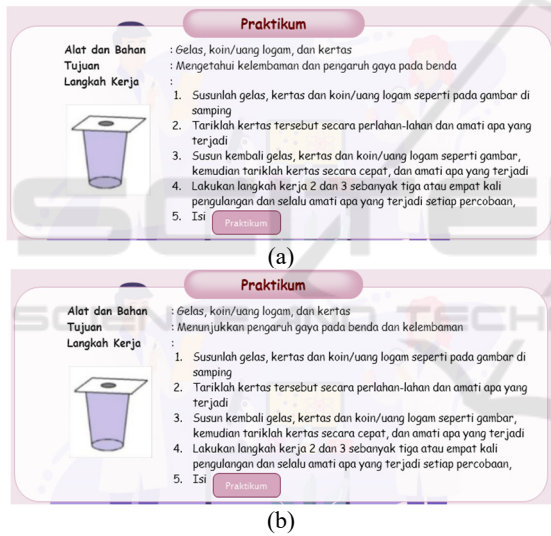


Figure 3: Experiment page before (a) and after (b) correction.

Providing a formula with its units is one of the essential things in Newton's equations, so the expert suggests completing this. The correction is presented in Figure 4.

Modules are designed to be used independently by students, so they must be designed as completely as possible and provide precise information so that there are no misconceptions for students. Based on this, the expert suggests completing the illustration of Newton's law with the direction of acceleration and a description of the use of positive and negative signs in the equation for the observed object, presented in Figure 5.

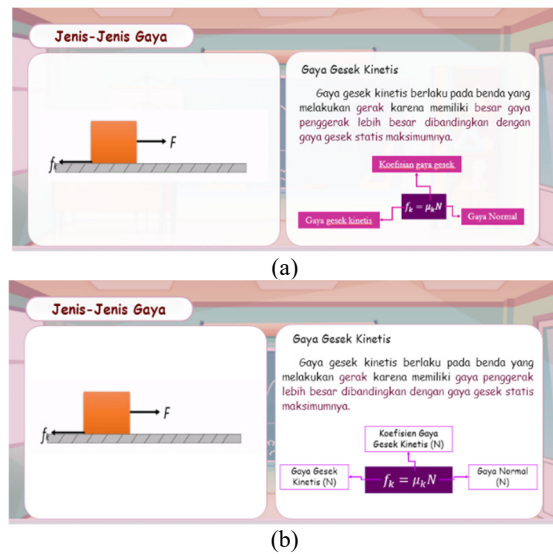


Figure 4: Types of force pages before (a) and after (b) correction.

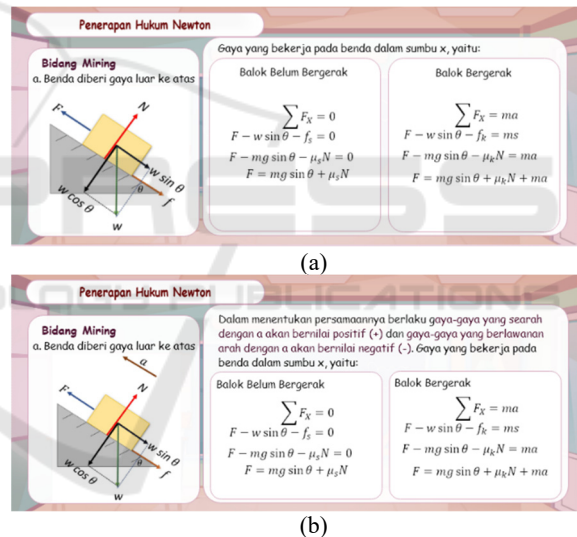


Figure 5: Illustration of Newton's lawpages before (a) and after (b) correction.

The score given by the expert on the physics content is 54 out of 60, so a percentage of 89% is obtained. These results are interpreted based on the product criteria in table 2 so that it can be said that the e-module developed is "Highly Valid."The resulting score from the physics content expert can be seen in Table 3.

Table 3: physics content validation results.

Validator	Score	Maximum Score	Percentage
Expert 1	54	60	89%
Expert 2	54		
Expert 3	53		
Total Score	161		
Average	54		

### 3.3.2 Digital Media Validator

Digital media expert validation was carried out to assess the media and digital function of developed e-modules. The expert suggests adding an image or animation on the cover that depicts the material contained in the e-module. Therefore, an animation of two people doing tug of war is added as an example of a force in rope tension. The correction is presented in Figure 6.

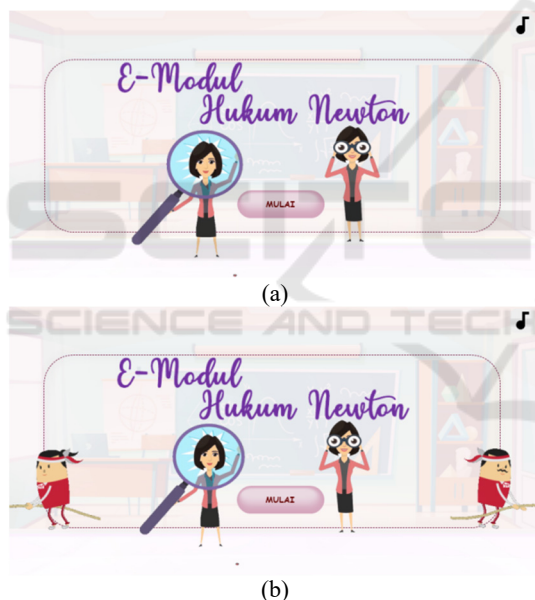


Figure 6: Coverpage before (a) and after (b) correction.

Other suggestions are font type and size in formula descriptions and colour selection on the gravity page. The font type and size in the e-module must be designed very well because it can interfere with students' comfort in using the e-module.

The score given by the expert on the digital media is 41 out of 44, so a percentage of 92% is obtained. These results are interpreted based on the product criteria in table 2 so that it can be said that the e-module developed is "Highly Valid."The resulting score from the physics content expert can be seen in Table 4.

Table 4: digital media validation results.

Validator	Score	Maximum Score	Percentage
Expert 1	39	44	92%
Expert 2	41		
Expert 3	42		
Total Score	122		
Average	41		

### 3.3.3 Indonesian Language Validator

Linguist validation is carried out to assess the language used in the module according to the sound and correct Indonesian provisions. The first suggestion is the repetition of sentences even though they have the same meaning in the description of the material. These corrections are presented in Figure 7.

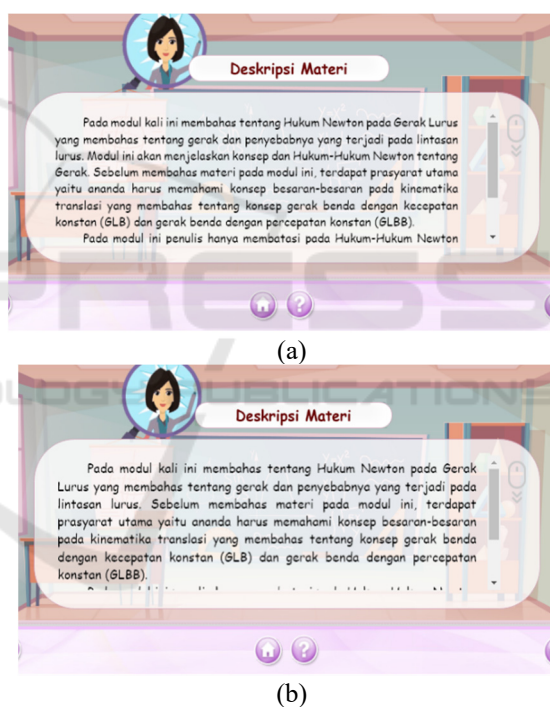
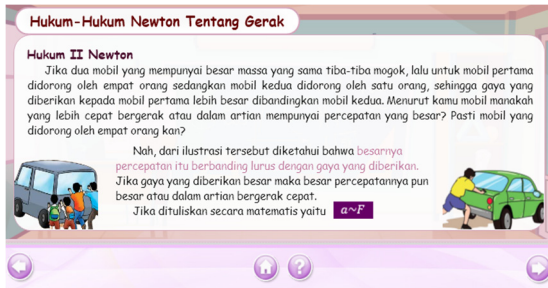


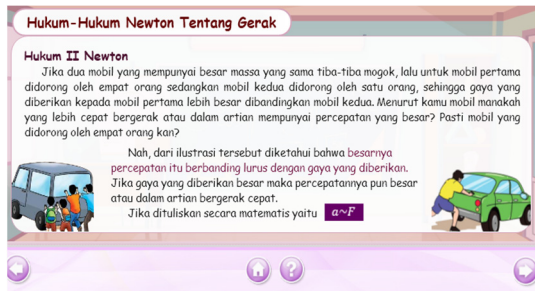
Figure 7: Content Descriptionpage before (a) and after (b) correction.

The use of less effective sentences is one of the suggestions that must be corrected. The error is on Newton's Second Law page, which can be seen in Figure 8.





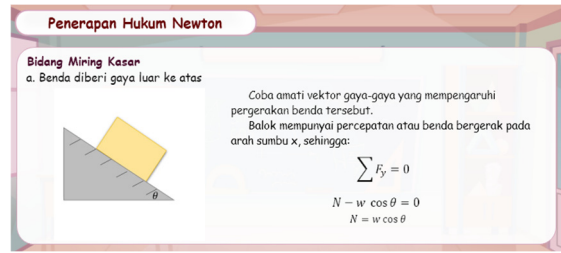
(a)



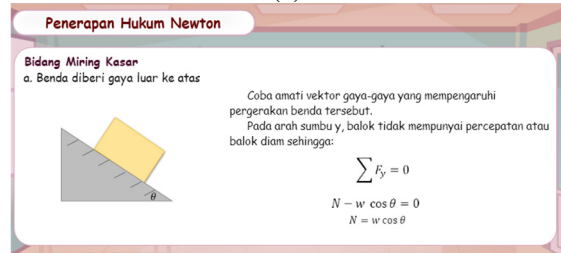
(b)

Figure 8: Newton's Second Law page before (a) and after (b) correction.

The narration that needs to be corrected on the flat and inclined plane material pages is to mention the axis and how it moves. The correction is presented in Figure 9.



(c)



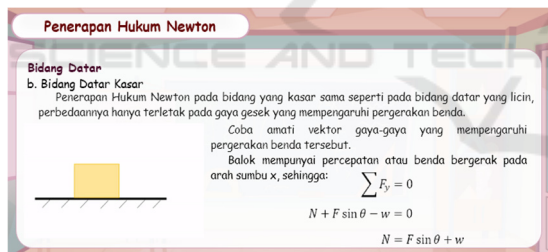
(d)

Figure 9: Application of Newton's Law in planepage before (a) and after (b) correction, and incline plane page before (c) and after (d) correction.

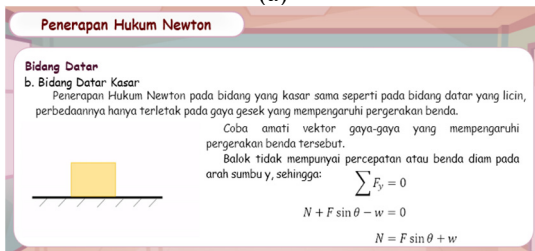
The percentage result from the linguist validation is 86%. These results are interpreted in table 2, concluding that the language used in the e-module is "Very Valid" to be used as a learning module in schools. These results were obtained from three validators with an average score of 21 out of a maximum score of 24, as shown in Table 5.

Table 5: Linguist validation results.

Validator	Score	Maximum Score	Percentage
Expert 1	21	24	86%
Expert 2	21		
Expert 3	20		
Total Score	62		
Average	21		



(a)



(b)

### 3.4 Implementation

The student practicality test was carried out on students of class X MIPA 7, consisting of 34 people. Students tried to use the e-module application and were asked to fill out an assessment questionnaire. The student practicality questionnaire is presented in the attachment. The results of the practicality test by students can be seen in Table 6.

Table 6: Practicality test results by students.

Average Score	Maximum Score	Percentage
23	28	82%



From the results of the practicality test, an average score of 23 was obtained from a maximum score of 28. So, a percentage result was obtained of 82%. Furthermore, these results are interpreted according to table 2, so it can be concluded that the android-based e-module assisted by Lectora Inspire is "Very Practical" used in the learning process.

The teacher practicality test was also conducted on physics teachers. The results of the practicality assessment by the teacher are presented in Table 7.

Table 7: Practicality test results by teachers.

Validator	Score	Maximum Score
Teacher 1	28	28
Teacher 2	21	28
Total	49	56
Average	25	28
Percentage	88%	

From the practicality test, a percentage of 88% was obtained with an average result of 25 from a maximum score of 28. The results of this percentage are interpreted in Table 2, which concludes that the e-module is "very practical" to use in the learning process.

### 3.5 Evaluation

The results of the input analysis given by the teacher and students show several advantages and disadvantages of this e-module. The advantages of e-module, according to comments given by teachers and students, include:

- a. e-modules are inserted by various multimedia products so that they are attractive to users
- b. e-module is easy to use
- c. can be used anytime and anywhere. Then the user can repeat the material so the student can get a better understanding of the concept
- d. separation of material that helps students understand the material in the learning process
- e. the e-module uses a national assessment model

The developed e-module has drawbacks, including:

- a. e-module has a large storage size
- b. there is no audio on/off facility

## 4 DISCUSSIONS

The features of this Newton's Law e-module include presenting various forms of multimedia that support the learning of Physics on Newton's Law. E-modules

are facilitated with learning videos that aim to help students understand the material and as an effort to make the developed e-modules attractive to students. Research also concludes that the understanding of students who use video media is superior to the understanding of students who do not use video media (Istiqomah et al., 2017).

Images are also inserted in the e-module, which will assist students in visualizing material, thereby helping students understand Newton's Law. The images presented in the e-module are moving images and static images. Student learning outcomes increase due to moving image-assisted learning and static images, of which the two have a higher increase, such as moving image-assisted learning (Ribawati, 2015).

Apart from videos and pictures, the e-module is also equipped with audio. The audio used as the background for the e-module is a soothing piano strain. It aims to reduce student anxiety in the learning process. Soothing sounds will affect brain performance to prevent learning difficulties caused by anxiety in the learning process (Angraini & Suyatna, 2017). The android-based Newton's Law e-module assisted by Lectora Inspire is also facilitated with practice questions to measure students' understanding of Newton's Law material. The questions presented in the e-module have various forms. It aims to conform to the national assessment model discussed in Permendikbud Number 17 of 2021 (Roffiq et al., 2017).

Discussion of material in the e-module is given a highlight to mark essential parts of the material. Marking important parts with a specific color can make it easier for students to remember and not easily forget. The use of color positively affects students' memory compared to when a material is written in black ink (Sujarwo&Oktaviana, 2017).

## 5 CONCLUSION

Based on the research and development results regarding android-based e-modules assisted by Lectora Inspire on Newton's Law, the development of android-based e-modules is in a very valid category. Product validity is based on the results of validation tests by physics content experts, digital media experts, and linguists. The expert validation gets a score in the percentage of 89%, 92%, and 86%, respectively, which is included in the highly valid category. The developed android-based e-module is in the highly practical category. It is based on practical tests conducted on students and teachers that obtained 82% and 88% scores.

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