Development of H5P-Assisted "Detective Story: Electrostatic Case" *Game* Learning Media on Class XII Static Electricity Materials

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Abstract: The purpose of this study is to develop an H5P-assisted "Detective Story: Electrostatic Case' game learning medium on static electricity materials for class XII senior high school students that is valid and practically used in physics learning. The development of this media is carried out as a solution to student difficulties in the student process due to lack of interest in learning physics and the ability of some students who lack mastery of concepts, formulas and calculations. The type of research used is research and development (R&D) using the ADDIE model which consists of five stages, namely the analysis stage, the design stage, the development stage, the implementation stage and the evaluation stage. The data collection instrument is in the form of validation sheets provided by three validators and practicality instruments that were tested on a small scale at SMAN 1 Kabun, Rokan Hulu, Riau, Indonesia as many as 20 people. The data analysis technique is by calculating the validation assessment using the validity index of Aiken's V formula. by 0.93. In addition, learning media is also stated to be practically used by students from the aspects of convenience and design, satisfaction aspects and efficiency aspects with an average practicality value index of 72.63%.

Keywords: game learning media "Detective Story: Electrostatic case, H5P, Static Electricity

1. Introduction

Learning difficulties can be interpreted as conditions in the learning process that are characterized by certain obstacles to achieving learning outcomes. One of the subjects that is often found with learning difficulties for senior high school students. Based on research conducted by Abbas & Hidayat, it was found that 7 internal factors affect the difficulty of learning physics, two of which are (1) the lack of interest of students in learning physics which causes them to quickly get sleepy, complain, have fun doing things they like by drawing in my mother's writing, lazy to take notes and lazy to enter class, (2) the ability of some students is very lacking, especially in mastery of concepts, Formulas and mathematical calculations are still low.[1] One of the difficult physics lessons was static electricity. Based on research conducted by Yolanda, this static electricity subject is a subject with a level of difficulty for students so that physics on the subject of static electricity is still seen as a scary learning, many formulations must be memorized, students have not found meaning, usefulness when taught by teachers and students have difficulty understanding physics concepts. [2]

Games are one of the entertainment facilities that are in great demand by the people of Indonesia. The APJII (Association of Indonesian Internet Service Providers) survey in 2022, shows that as many as 77.02% of Indonesians use the internet. As many as 93.75% of them are high school / vocational high school students who are penetrating the internet. This shows that almost all internet users in Indonesia are senior high school students. The survey also showed why people use the internet and found that 77.32% of Indonesians access online games. Games are used to fill free time, refereshing, and playing with friends. The games played also vary from mobile, PC, desktop, website that can be played online or offline. The amount of public interest in games, especially high school senior students, can be applied in learning. One way is to incorporate the game's content into learning commonly referred to as educational games. Educational games can be in the form of learning media that students use to understand the material. By using learning media in the form of educational games, it is hoped that students will have a great interest in learning such as their interest in online games so that the problem of student interest in learning that cannot be overcome. According to Budianto, in Prasetiyo, an interesting and fun learning environment can make it easier for students to understand learning materials, games can be used to create the learning environment. [3] Educational games are games specifically designed to teach users a certain learning, develop concepts and understanding and guide them in training their skills, as well as motivate them to play Diharjo [4]. According to Nuqisari & Sudarmilah educational games are games designed to stimulate thinking including increasing concentration and solving problems.[5] Educational games are one of the media used to provide teaching, increase knowledge for users through a unique and interesting medium. In

addition, according to Henry in Hamka & Gani states that games that contain educational content and have the purpose of being an angler of children's interest in learning materials while playing. [6]

Currently, there are many learning models that are considered very efficient if applied in learning, especially physics learning. One of the hottest learning models in Indonesia today is the case-based learning model. Case based learning is a learning model where students will discover concepts through solving cases in the real world. This case method not only teaches students to understand but also discovers the meaning and usefulness of physics concepts in real life. This case-based learning can be integrated into educational game content. In this study, researchers carried out this integration by developing the learning media for the game "Detective Story: Electrostatic case" assisted by H5P on class XII static electricity materials.

H5P (HTML 5 Package) is a free and open source software with recognition from the Massachusetts Institute of Technology (MIT) that can assist everyone in creating, sharing and using HTML 5 Amali interactive content[7]. H5P has advantages in terms of its use in learning media compared to other applications, namely various interactive features in H5P such as interactive videos, interactive quizzes, interactive presentations, and other interactive learning media that we can design using this H5P.

2. Methodology

The type of research carried out is Research and Development (R&D) research using instructional design ADDIE (Analyze, Design, Development, Implementation and Evaluation). The ADDIE learning design model was originally developed by Reiser and Mollenda, then redeveloped by Dick and Carry in 1996 to design and build a better learning system Sugiarta [8]
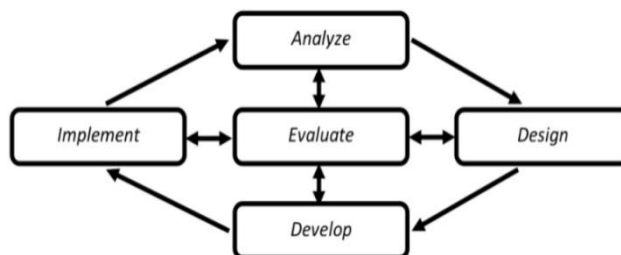

Figure 1 Stages of the ADDIE [9]

The instrument used in this development research is in the form of validation and practicality assessment sheets on a small scale. The validation assessment sheet includes aspects of design feasibility, aspects of pedagogical feasibility, aspects of content feasibility and technical feasibility aspects. Validation is carried out by 3 validators, one of whom is a lecturer in postgraduate physics education at Riau University and the other 2 people are bachelors of physics education. After validation, a trial of the practicality of learning media was carried out on a small scale. The trial was conducted at SMAN 1 Kabun, Rokan Hulu district, Riau, Indonesia with a sample of 20 class XII students using a likert scale as shown in Table 1.

Table 1 Category Penilaian LembarValiditas

No	Category	Score
1	Totally Agree	5
2	Agree	4
3	Disagree	3
4	Disagree	2
5	Strongly disagree	1

(Sugiyono, 2015)[10]

Furthermore, the validity value is calculated using Aiken's V formula as follows:

$$V = \frac{\sum s}{n(c - 1)}$$

Information:

$s = r - L_o$

V = Aiken validity index

L_o = Lowest validity rating number (1)

c = Highest validity assessment number (5)

r = Validator given score

n = Number of validators

The learning media for the game "Detective Story: electrostatic Case" is declared valid if all instrument assessment indicators of validity and practicality have a coefficient value of Aiken's V >0.4.[11] The category determination of Aiken's V coefficient can be seen in Table 2.

Table 2. Interpretation of Koefficient Aiken's V

No	Value	Category
1	$0.80 < V \leq 1.00$	Very High
2	$0.60 < V \leq 0.80$	Tall
3	$0.40 < V \leq 0.60$	Enough
4	$0.20 < V \leq 0.40$	Low
5	$0.00 < V \leq 0.10$	Very Low

(Azwar in Dinata,2017) [12]

While the practicality analysis is used with percentage values (%) as follows:

$$Practicality\ value = \frac{Jumlah\ skor\ yang\ diperoleh}{Jumlah\ skor\ maksimum} x100\%$$

After the percentage of practicality values is obtained, grouping is carried out according to the criteria contained in Table 3 below:

Table 3. Practicality Grading Criteria

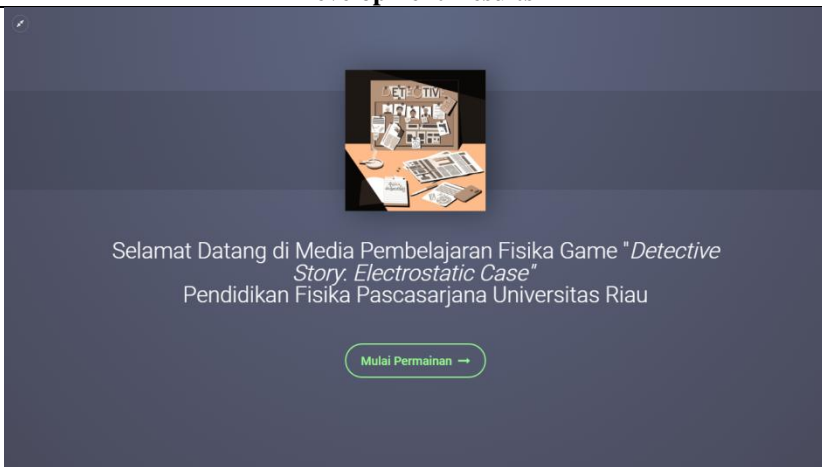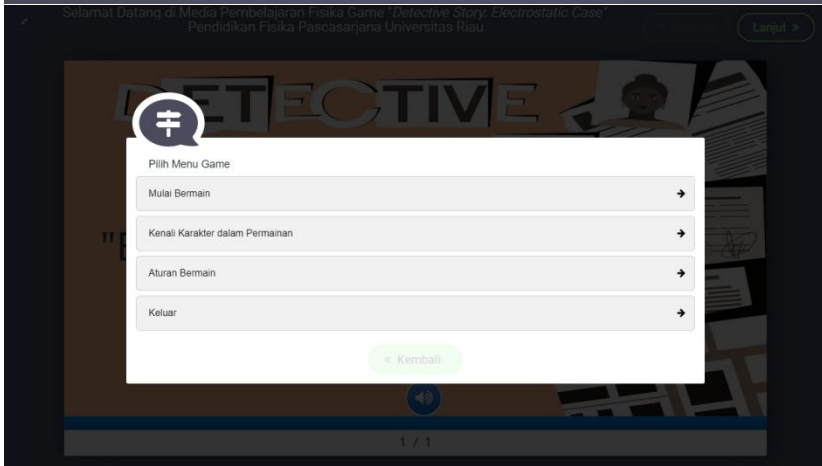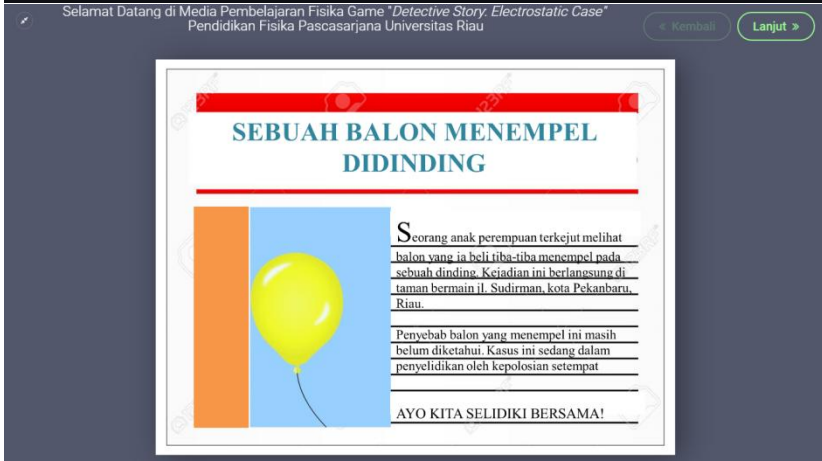| No	Percentage (%)	Criterion
1	81 – 100	Very Practical
2	61 – 80	Practical
3	41 – 60	Quite Practical
4	21 – 40	Less Practical
5	0 – 20	Impractical

(Riduwan, 2010) [13]

3. Results and Discussion

This development research will produce a product in the form of a learning media for the game "Detective Story: electrostatic Case" assisted by H5P on class XII static electricity materials.

The development model of this type consists of 5 stages of development:

1. Analyze, which is the stage where the researcher animates the problem so that it is necessarydevelopment of the game learning media "Detective Story: Electrostatic Case". The analysis that will be carried out by the researcher consists of several development analyses including needs analysis, namely analyzing problems / difficulties and characteristics of students in Static Electricity learning as explained in the study and task analysis, namely material structure analysis by examining the achievement of goals (CP) and the flow of learning objectives (ATP) contained in the independent curriculum, after knowing the structure of the material, it is expected that learning media that will be designed to achieve these learning outcomes.

2. Design, namely designing the learning media for the game "Detective Story: Electrostatic Case" according to the analysis carried out previously. The steps taken at this stage include designing game scenarios, creating history boards, creating storyboards, and compiling materials that will be included in learning media.

3. Development, which is a real step to realize a predetermined design. The development is tailored to the needs that have been analyzed and the systems that have been designed. The development steps of the game media "Detective Story: Electrostatic Case" using H5P are as follows:
   a. Create a game character using the Super Me app
   b. Record the voices of the characters in the game. The voice recording is done by 4 different people by reading the script in the game scenario.
   c. Create content charts of game learning media using branching scenarios in H5P that have been integrated into the lumi education website in accordance with the history board design.
   d. Fill in the game content into these charts according to the previously designed storyboard. This content is in the form of images, backgrounds, music, sound recordings, materials and evaluation questions.
   e. Save and publish content. This learning media is published through the lumi education website so that students can access online the learning media.

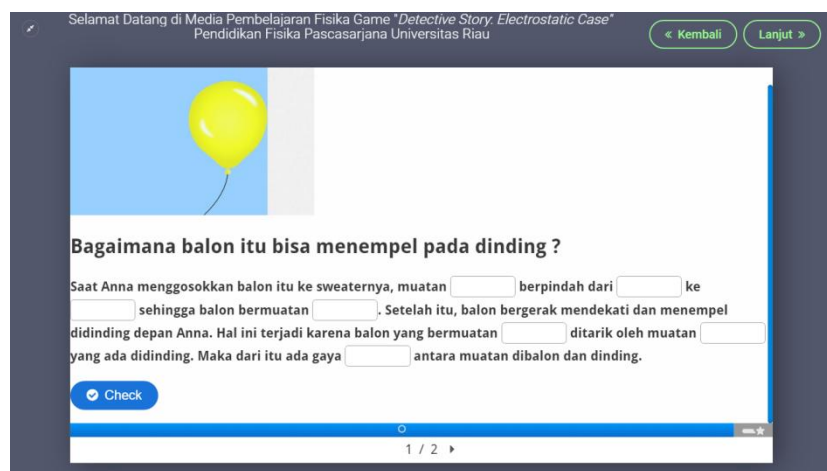The results of the development of learning media can be seen in Table 4.

Table 4. Learning Media Development Results

Aspects	Development Results
Menu Offerings	
Game Main Menu	
Case View	

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Investigation Process View

Case Resolution view

4. Implementation, namely testing the use of the game learning media "Detective Story: Electrostatic Case" which was completed by researchers. The product is implemented by opening the game website at https://app.lumi.education/content/_63740b7b4630f21b92563075 so that researchers can see whether this game learning media is in accordance with previous planning.

5. Evaluation, which is to pay attention to the shortcomings and mistakes that exist in the learning media. This evaluation stage is carried out at each stage of ADDIE. Based on the results of the evaluation, researchers can revise the product so that it produces the desired game learning media. Prawiradilaga in Haya stated that according to Mollenda, the revision (*Evaluation*) can occur continuously in every stage that is passed but is not clearly stated. [14]

The five stages of the ADDIE learning design model that have been carried out, will finally produce an H5P-assisted "Detective Story: Electrostatic Case" game learning media application on static electricity materialsthat are ready to be tested for validity by validators. This validation aims to obtain a valid "Detective Story: Electrostatic Case" game learning media. The validation results of the learning media of the game "Detective Story: Electrostatic Case" assisted by H5P on static electricity material for class XII students were carried out for design feasibility aspects, pedagogical feasibility aspects, content feasibility aspects and technical feasibility aspects. The validation results on the design aspect are presented in Table 5.

Table 5 Results of Learning Media Validation on Design Aspects

No	Assessment Items	V	Validation Criteria
1	Attractive and appropriate learning media screen design	1	ST
2	The letters used are appropriate and easy to read	0.92	ST
3	Images in the media according to the contents	0.92	ST
5	Images used help learning	0.92	ST
6	Colors that are used after the reading	0.83	ST
7	The sound used is correct and does not interfere	0.92	ST
8	The button or sign used is easy to recognize	1	ST
9	Consistent positioning of text, graphics, video and markers	1	ST
10	Complete software with instructions and user manual	0.67	T
	Average number of validity indexes	0.90	

Ket. T=High; ST=Very High

Table 5 shows the results of Aiken'V calculations for each assessment indicator on the design aspects of the game learning media "Detective Story: Electrostatic case". The data shows that all indicators are valid with validity indices ranging from 0.67 to 1 and have an average Aiken validity index of 0.90 with suggestions that clearer instructions for use need to be made. An assessment on the feasibility aspects of pedagogy is presented in Table 5.

Table 6 Results of Validation of Learning Media in Aspects of Pedagogy

No	Assessment Items	V	Validation Criteria
1	Clearly written teaching competencies	0.92	ST
2	Teaching competencies can be achieved	0.92	ST
3	The formulation of competencies becomes a guideline for media users	0.92	ST
4	The presentation of the topic attracts the attention of students	0.92	ST
5	The information conveyed is easy to understand	1	ST
6	This medium encourages students to think creatively	1	ST
7	Regular and easy-to-follow presentation of the material	0.92	ST
8	Examples and exercises given according to the material	1	ST
9	Learning methods suitable for multimedia media	0.83	ST
	Average number of validity indexes	0.94	

Ket. ST = Very High

Table 6 shows the results of Aiken'V calculations for each assessment indicator on the pedagogical aspects of the learning media of the game "Detective Story: Electrostatic Case". The data shows that all indicators are valid with validity indices ranging from 0.83 to 1 and have an average Aiken validity index of 0.94. Assessments on the eligibility aspects of content are presented in Table 7.

Table 7 Results of Validation of Learning Media on Content Aspects

No	Assessment Items	V	Validation Criteria
1	Lesson materials in accordance with the Merdeka Curriculum	0.83	ST
2	Subject matter in accordance with competence	1	ST
3	Lesson Materials in accordance with the learning objectives	1	ST
4	Lesson materials according to the level of ability of the student	0.75	T
5	Lesson materials according to the basic knowledge of students	0.75	T
6	Lesson materials contain educational value	0.92	ST
7	Lesson material accompanied by exercises	1	ST
8	Exercises according to the topic of the lesson	0.92	ST
9	Lesson materials accompanied by formative tests	0.83	ST
10	Formative tests according to the subject matter	1	ST
	Average number of validity indexes	0.9	

Ket. T=High; ST=Very High

Table 7 shows the calculation results of Aiken's V for each assessment indicator on the content aspect of the learning media of the game "Detective Story: Electrostatic Case". The data shows that all indicators are valid with validity indices ranging from 0.75 to 1 and have an average Aiken validity index of 0.9. An assessment of the technical feasibility aspects is presented in Table 8.

Table 8 Results of Validation of Learning Media on Technical Aspects

No	Assessment Items	V	Validation Criteria
1	Users can control the learning process	0.92	ST
2	Media has many branches to other parts	1	ST
3	Users are not stuck while browsing media	0.92	ST
4	The journey of presenting media content is easy to follow	1	ST
5	There is more than one acquisition of information	1	ST
6	Users can easily find the information they need	0.92	ST
7	Users can exit the media whenever they want	1	ST
8	Easy to use (operated) software	1	T
	Average number of validity indexes	0.97	

Ket. T=High; ST=Very High

Table 8 shows the calculation results of Aiken's V for each assessment indicator on the technical aspects of the learning media of the game "Detective Story: Electrostatic Case". The data shows that all indicators are valid with validity indices ranging from 0.92 to 1 and have an average Aiken validity index of 0.97.

Furthermore, the practicality of the learning media of the game "Detective Story: Electrostatic Case" was carried out by testing on a small scale on class XII students at SMAN 1 Kabun, Rokan Hulu, Riau, Indonesia as many as 20 people. The results of the practicality of the learning media of the game "Detective Story: Electrostatic Case" assisted by H5P on class XII static electricity materials were carried out for aspects of ease of use and design, aspects of satisfaction and aspects of efficiency. The following are the results of practicality by class XII students of SMAN 1 Kabun shown in Table 9.

Table 9 Results of the Practicality of Learning Media in Every Aspect

No	Assessment Aspects	Practicality Value (%)	Practicality Criteria
1	Convenience and design aspects	73,3	Practical
2	Satisfaction aspect	74	Practical
3	Efficiency Aspects	70,6	Practical
	Average number of practicality indices	72,63	Practical

Based on the data analysis of Table 9, it is known that the learning media of the game "Detective Story: Electrostatic Case" has practical statements for all aspects. This means that the learning media of the game "Detective Story: Electrostatic Case" both in terms of convenience and design, satisfaction aspects, and practical efficiency aspects are used by students in the static electricity learning process.

4. Conclusions and Recommendations

The results of this study concluded that the learning media of the game "Detective Story: Electrostatic Case" is valid in accordance with valid validation results and is practically used by students in accordance with the results of practicality tests conducted at SMAN 1 Kabun, Riau, Indonesia. The learning media for the game "Detective Story: Electrostatic Case" is set for a case-based learning model so that this media is worthy of being tested on a case-based learning learning model in schools. In addition, this learning media was developed to develop students' *multiple intelligent* learning abilities because it has been equipped with audio, video, moving images and animations.

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