



The Development of Interactive Learning Media of Parabolic Motion Lesson Materials with Patil Lele Traditional Games

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Abstract

Indonesian cultures are starting to fade due to technological developments. One of the solutions is by introducing Indonesian cultures to students at school. This research aimed to generate an effective and valid traditional culture-based interactive learning media, therefore it can be used in learning physics. The learning media that was developed by researcher was an interactive learning media on the parabolic motion subject with 3-dimensional animation of Patil Lele's traditional game. This research was development research with the Thiagarajan model, which has been modified into 3D (Define, Design, and Develop). The data were collected by using an expert validation sheet and student test. The results showed that the learning media was valid and effective, with an average percentage of the validator's assessment 90.8% and the percentage of student learning completeness 82.35%. Referring to the analysis results that has been carried out on the media that was developed, it was included as valid and effective category for use, therefore the learning media product is able to be used in learning physics.

Keywords: android; interactive learning media; parabolic motion; patil lele; physics learning

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INTRODUCTION

The rapid flow of information and telecommunications affect the reducing desire to preserve culture (Surahman, 2013). One way to overcome cultural values that are starting to be marginalized is by introducing traditional cultural knowledge to students in the classroom (Sukesti, Handhika, & Kurniadi, 2020). The introduction of culture to students can be performed by integrating indigenous scientific processes (culture) into school science. When students are invited to observe natural phenomena as well as local culture, students will

indirectly think about science (Sumarni, Faizah, Subali, Wiyanto, & Ellianawati, 2020). Traditional games are a cultural / ethnocentric heritage that must be bequeathed to young generation (Maryani, 2013) (Hanief, 2017). Traditional games that are scattered throughout Indonesia and were once prevalent in their time were the Benthic or Patil Lele games (Setiawan, Innatesari, Sabtiawan, & Sudarmin, 2017). The illustration of Patil Lele traditional games is shown in Figure 1.





Figure 1 Illustration of Patil Lele Traditional Games

Based on preliminary observations, it was recognized that each stage in the Patil Lele game is an activity that used the concept of physics. The steps of leveraging (throwing a small piece of wood into the air), pegging (hitting the wood so that it bounces up), and hitting puppies in the Patil Lele game are activities that use physics concepts.

Physics is included in Ethnoscience's realm; therefore, it plays a substantial role in converting people's original science into scientific knowledge (Novitasari, Agustina, Sukesti, Nazri, & Handhika, 2017). Marhadini et al., (2017) mentioned that one of the physics materials that students consider difficult is parabolic motion. This statement is supported by the study results conducted by (Wibowo & Sunarti, 2020). Oktavia, (2015) argued that students' problems in learning physics could be overcome by modifying the learning media used by them.

Before the learning media is applied, it should be confirmed the validity and effective aspects, the determination of the validity was performed with validity testing by the professional or expert validators (Ummah, 2021). Fitria (2017) revealed that validity is a measure that demonstrate the validity level of a product that has been developed based on the assessment aspect according to the type of product. Second, effective means that is easy to attain the accomplishment of learning objectives. (Widjayanti, Masfingatin, & Setyansah, 2019) said that the effectiveness of learning media is

fulfilled if 80% of students meet the learning completeness criteria, after use this learning media.

One of the learning media modifications that can increase student learning motivation is interactive learning media (Barokah, Asrial, & Maison, 2019). Based on the study results conducted by Bahri & Huda, (2019), he recognized that using interactive learning media at SMKN 1 Padang was able to increase student learning outcomes by 5.13%. Vita, (2019) explained that learning media using animated videos could improve student learning outcomes.

Research on the development of animation learning media on android was conducted by Anggraeni & Kustijono, (2013) and showed that animation learning media on android could increase student learning motivation. In subsequent research associated to the advantages of 3D animation on student learning outcomes was carried out by (de Jager, 2017), identified that 3D animation was proven qualified to increase students' understanding towards material that was considered difficult. Other research related to the development of learning media by adopting traditional culture was carried out by (Rohmah, Sari, Pangasta, & Deddiliawan, 2019), indicated that the generated product was included in valid and effective category where 90% of test results from students who used the media were categorized as complete. Based on current cultural conditions, the advantages of learning media interactive and accomplishment of development on learning media by integrating traditional culture that has been studied by previous researchers, encourages researcher to conduct a study entitled The Development of Interactive Learning Media Parabolic Motion Lesson Materials with Patil Lele Traditional Games

METHOD

The type of research was research and development which had the aim to develop physics learning media as well as elevate traditional Indonesian culture. The development phase adapted the

Thiagarajan model that had been modified into 3D, namely *Define*, *Design*, dan *Develop* (Asi, 2017). Further explanations about the research stage are described in the following figure (Figure 2.)

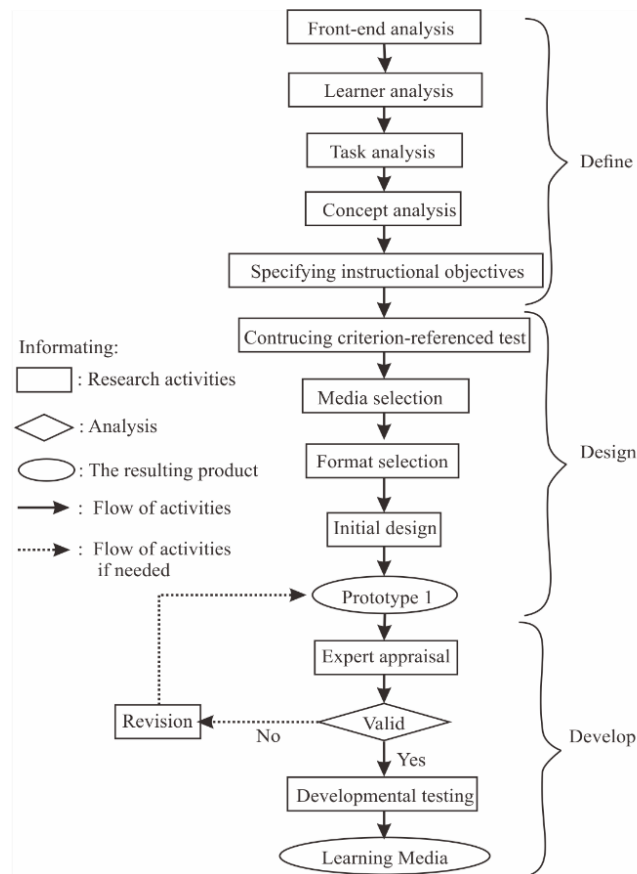


Figure 2 Chart of Research Stages

Define includes preliminary analysis, student analysis, task analysis, concept analysis, and specification of objectives. This stage was carried out to determine the learning media that required by teachers and students referring to the requisition of applied curriculum. Furthermore, the design includes the preparation of tests, media selection, format selection and initial media design. Based on the results of the analysis in the previous stage, researcher designed the media in android application form, which

contained 3D animation of parabolic motion material in the traditional Patil Lele game.

Develop includes expert validation and field trials. The validation of media was conducted by two lecturers and one physics teacher. The instrument that was used by expert and teacher for assessment was in a questionnaire form, which includes several items, such as : the suitability of content, presentation, function, and ease of use. The questionnaire was developed

qualitatively using Likert scale 1 – 4, which is 4 = very good, 3 = good, 2 = bad and 1 = very bad. The validity of the learning media was obtained by analyzing the percentage given by the validator using the table 1.

Table 1 Product expert judgment level

Percentage	Level of validity
$80.00\% < P \leq 100.00\%$	Good/Valid
$60.00\% < P \leq 79.99\%$	Good Enough/Fairly Valid
$50.00\% < P \leq 59.99\%$	Poor /Invalid
$0\% < P \leq 49.99\%$	Not Good

(Riduwan, 2012) .

Field trials were conducted on 34 students of class X. Based on the interviews results with teachers, 100% of students at this school have Android smartphones. The aim of field trials was to determine the effectiveness of the media after it was used by students, through evaluation tests. The effectiveness of learning media wss discovered by analyzing user success rate through evaluation tests (Rusman, 2017). The effectiveness of learning media is fulfilled if 80% of students get the minimum completeness criteria (Widjayanti et al., 2019).

RESULT AND DISCUSSION

Product Display

In this study, the researcher created an android application with the following menus:

Main menu

The main menu in this application presented several buttons that lead to the next menu. The main menu display is shown in Figure 3.



Figure 3 Main Menu

Patil Lele Menu

This Patil Lele menu contains the history and techniques of playing the traditional Patil Lele game, which is shown in Figure 4.

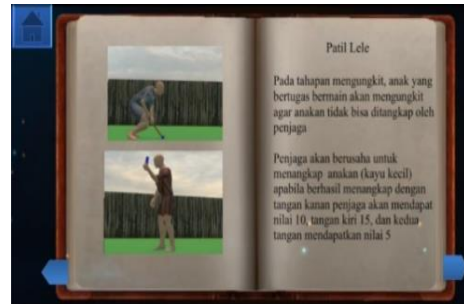


Figure 4 Patil Lele Menu

Profile Menu

The profile menu contains the profile of the learning media developer. The profile menu display is shown in Figure 5.



Figure 5 Profile Menu

Basic Competencies menu

This menu contains basic competencies, which is the focus of development on learning media products. The Basic competencies menu display is shown in Figure 6.

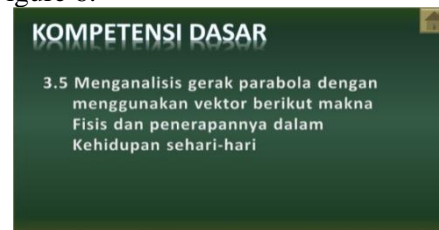


Figure 6 Basic Competency Menu

Material menu

This material menu contains the definition of parabolic motion, an explanation of travel time, velocity, and position of objects in the curved parabolic trajectory. This menu also

provides questions that relevant to the subjects, as shown in Figure 7.

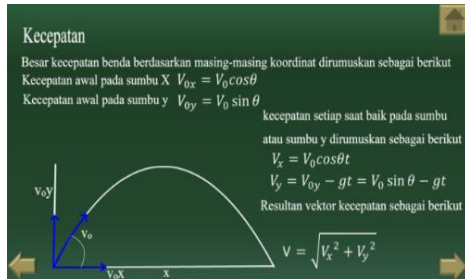


Figure 7 Display of Content Menu

Animation menu

In this animation menu, students can observe that in the traditional patil lele game integrates parabolic motion. This media becomes interactive because it allows a reciprocal relationship between users and the product. The animation menu in this application displays a three-dimensional animation of the traditional Patil Lele game. The animation moves according to the angle and speed according to user control by pressing the button. The animation menu displays shown in the following Figure 8.

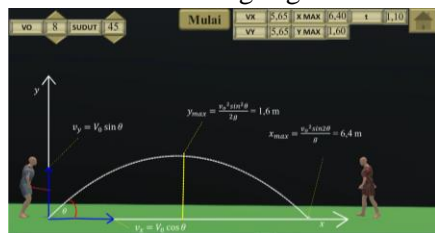


Figure 8 An Animation Display of Parabolic Motion in The Traditional Patil Lele Game

Exit Menu

The exit menu is used when the user has to close the application. When the user pushes this menu, it automatically pops up a question to confirm whether they prefer to exit or return to the main menu. This menu displays shown in Figure 9.



Figure 9 Display of The Exit Menu

This application is equipped with a user guide to facilitate the users to install and execute Android applications. The display of the user guide is shown in Figure 10.

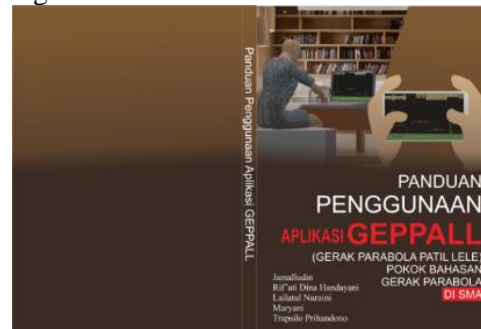


Figure 10 Instructions for Using The Application

Validation Results

In this interactive learning media, animations were created by using Blender 3D software, while for applications used Adobe Animate software. This research used the development research method with the modified Thiagarajan model into 3D (define, design, and develop). The media was validated by two lecturers and one physics teacher. This validity test was supported by Ummah, (2021) which explained that in order to determine the validity of the media, therefore the validity test was conducted by professional or expert validators.

A validator validated this application using a questionnaire with a score ranged from one to four. Four components were validated, such as content, presentation, function, and ease of use. The final

results, which were obtained by average all the data, are presented in Table 2.

Table 2 Average Results of Expert Validation

NO	Components	Percentage
1	Content	90.0 %
2	Presentation	88.3 %
3	Function	91.6 %
4	Ease of Use	93.3 %

The aspects that were assessed in the "Content Component" consist of the suitability of media with basic competencies menu, the aptness of media with character students, the aptness of media with learning objectives, the aptness of the material described coherently and following scientific truth. The average score of three validators for this component was 90.0%.

Then, for "Presentation Component," were assessed the ease of understanding language used in this application, including animation display, background display, color selection, and animation configuration. The average score for this component was 88.3%.

Next, the aspects that were assessed for "Function Component," included the capability of media to trigger interaction with users, to increase the curiosity, attract user attention, create an attractive atmosphere, and facilitate the users to understand the material. The average score for this component was 91.6%.

Finally, for "Ease of Use Component", assessed the ease of sharing and installing media, the ease of use (without confusing the user), memory size was small, and there was no delay. The average score for this component was 93.3%, valid and easy to use category.

Based on several aspects that were evaluated by experts, in terms of content, function, presentation and ease of use, obtained an overall average of 90.8%, it is concluded that this media is valid and feasible for use. This conforms with other opinion from Fitria, (2017) who revealed

that validity was a measurement that demonstrated the validity level of a product that had been developed based on the assessment aspect according to the type of product.

This learning media was capable to display text, images, sound and animated videos that could be executed according to instructions from the users. This media was classified as interactive because to operate it created a reciprocal relationship between media and users, therefore students who used it became more active in learning activities. This is in line with Maryani, (2013) who mentioned that interactive media was a medium that allowed a reciprocal relationship between media and its users.

The animation that was used in this media was referred to the traditional patil lele game. Animated videos showed the existence of parabolic motion in the culture. This animation was created to promote Indonesian traditional culture in modern science learning, therefore high school students indirectly participated to preserve Indonesian traditional culture. This is supported by the statement of Sukesti et al., (2020) who mentioned that one way to overcome cultural values was starting to fade, namely by introducing culture to students in school.

Student Test Results

After the learning media was validated by expert, the next stage was to execute field trial. This trial was conducted by 34 students of class X in 2 meetings. The details of the student test results data analysis are described in table 3.

Table 3. Analysis of student learning outcomes

Components	Class X
Number of students	34
The highest score	100
The lowest score	56
The number of students with score less than 80	6

The number of students with score higher than 80	28
Average	82.50

The average value of the test obtained by students class was 82.5, with the percentage of students with score more than 80 was 82.35% (28 students) and score less than 80 was 17.65% (6 students).

This test was attended by 34 students of class X. The aim of this test was to determine the effectiveness of the learning media that was developed. The test was performed after the students learned how to use this media. The lowest score that obtained in this test was 56 and the highest score was 100, while the average test score was 82.50. According to the information from teachers and students, the minimum completeness criteria (KKM) in school that held this trials was 80. The number of students who got score more than or equal to 80 was 28 students or 82.35% of the total students who took this test.

Based on the percentage that obtained in this study, it can be concluded that the media is categorized as effective to use. This is in line with the opinion from Widjayanti *et al.*, (2019)) which mentioned that the effectiveness of learning media is fulfilled if 80% of students meet the minimum completeness criteria after using the developed product. This is in line with the study results of Muchlas, (2018) about the Developing an Online Learning Media Using a Smartphone for the Electrical Machinery Course, which found that 84% of research subjects achieved learning completeness scores. This results showed that the animation in the application product could attract the student's attention and interest. Referring to the results of the interview in the define stage, researcher identified that students were more interested in learning with pictures or videos rather than

writing. This is supported by the study results of Hoyek *et al.*, (2014) entitled Effectiveness Of Three-Dimension Digital Animation In Teaching Human Anatomy In An Authentic Classroom Context, which proved that the three-dimensional animation contributes to improve students' understanding the material about anatomy

CONCLUSION

Based on the results of this study, it can be concluded that the interactive learning media in the traditional Patil Lele game had been successfully created with several menus in it. Based on the overall average percentage given by validators 90.8%, this media is categorized as valid as well as effective to use referring to the percentage of students learning completeness 82.35%. Referring to the analysis results that has been carried out on the media that was developed, it is included as valid and effective category for use, therefore the learning media product is able to be used in learning physics.

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