

INTERACTIVE LEARNING MEDIA" *JELONPRO*" TO LEARN PARABOLIC MOTION IN PHYSICS FOR X GRADE STUDENTS OF SCIENCE CLASS IN SMA NEGERI 1 MALANG

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ABSTRACT

There has been some scientific writings about interactive media "jelonpro". And this study is conducted to explain how to create interactive learning media" jelonpro" for the concept of parabolic motion for X grade students of Science Class in SMA 1 Malang and to explain its application in learning in the laboratory using two methods. Those are the experimental method and discussion. The teacher acts as a facilitator and motivator. This is due to the importance of learning media in teaching and learning activities. In learning the concept of parabolic motion, physics teachers at SMAN 1 Malang have not used interactive media. Making "jelonpro" media is quite easy and tools and materials are easily available. Nevertheless, the interactive learning media "jelonpro" still needs further development so that it is more optimal to be used in learning the concept of parabolic motion.

Keywords: interactive media "jelonpro", parabolic motion

INTRODUCTION

Physics is one of study that requires media to explain the material. Physics is not a lesson that consists of concepts and presented by formula. Learning physics requires direct experience of students. According to Supardi U.S, et al (2012) when conducting research that one of the roles of learning media is to provide experiences to students that cannot be obtained directly, but can be presented through learning media.

Physics is knowledge that is compiled based on facts, natural phenomena, the results of a thought, and the results of experiments. Applications from physics materials are generally very close to everyday life, so physics learning is very good when applied using experimental methods. This is in line with the goal of physics learning which is demanded at the high school level (Ministerial Regulation No. 59 of 2014) states that 2013 Curriculum aims to preparing Indonesian people to have life skills as individuals

and citizens who are faithful, productive, creative, innovative, and affective and able to contribute to the

life of the world, nation, state and world civilization. With the above learning objectives, the school must prepare students who can anticipate the challenges of life that are very complex and can compete in the global era and prepare students to become citizens of the world who are proud of Indonesian culture, able to think critically and holistically, solve problems, independently, and can work with other people.

The education unit at *SMAN 1 Malang* supports the purpose of education, with one of its visions stating that it will create a superior generation in achievement, noble, skilled and independent. Its implementation is set forth in one of its missions which is to carry out effective learning and mentoring so that each student can develop optimally, excel in skills as a provision for life in the community. To realize the vision and mission, namely by realizing an active, innovative, creative, effective, fun, challenging and meaningful learning process. This is a challenge for the *SMAN 1 Malang* school program to always make learning innovations both in media use and learning methods.

The physics learning paradigm that is oriented to the teacher as the center of learning activities (teacher centered) and text book oriented learning, raises various responses and also various attempts to change the paradigm. Reality in the field shows that some physics instructors at *SMAN 1 Malang* have not used interactive media for the concept of sub kinematics of parabolic motion material. In addition, students are very good at memorizing formulas, but are less skilled in applying the knowledge they have. These conditions make it difficult for students to learn the concepts of physics.

One way of delivering physical material that can bridge between abstract physical concepts and real physical conditions is to use interactive media. Through interactive media, teachers can use two learning methods namely experimentation and discussion. Physics learning activities with experimental methods are very important to be carried out so that students are directly involved with nature to learn themselves and the prospects for further development and application in daily life (Setiawan.A et al, 2012). Based on these conditions, the writer and instructor at *SMAN 1 Malang* designed and made an interactive media called "*jelonpro*" for parabolic motion.

A simple experiment tool in the form of interactive media "jelonpro" has several advantages related to making, namely tools and materials easily available, quite easy to imitate, and able to improve teacher creativity. With this "jelonpro" interactive media later in learning parabolic motion, teachers no longer only use lecture and demonstration methods. Learners can conduct their own experiments and discussions to understand the concept of parabolic motion that is precise, accurate, and instantaneous. In addition, it can discuss abstract physical concepts with real physical conditions.

This writing is done to answer the following problems.

- 1) How to make a simple experimental tool in the form of interactive media "jelonpro" for learning parabolic motion?
- 2) How is the application of simple experimental tools in the form of interactive media "jelonpro" in parabolic motion learning?

THEORETICAL FRAMEWORK

Learning media is a channel that contains messages from the source or distributor for the target or recipient of the message. While the material to be conveyed is a learning message, and the goal to be achieved is the learning process. The use of learning media that contains the message of learning material is expected to achieve the learning objectives. Learning media is designed and made to facilitate students in understanding a concept or facilitating learning (Yusuf Hadi Miarso in Mustiqon, 2012: 27).

Davies (2000: 193) says that there are two main functions of learning media, those are 1) helping teachers to manage learning efficiently, and 2) helping students to learn more efficiently. The teacher should be aware that the use of learning media will greatly facilitate his task in conveying messages or material to students. With the aid of learning media, the learning materials that are difficult, complicated, and complex to digest will be easier for students to understand. Teachers need to know, be able to choose, and use the right media in the learning process to facilitate the material to be learned by students.

Parabolic motion is a combination of Regular Straight Motion (GLB or *Gerak Lurus Beraturan*) on the X axis and Regular Changed Straight Motion (GLBB or *Gerak Lurus Berubah Beraturan*) on the Y axis. This motion is a two-dimensional motion of particles thrown sideways into the air. Effect of air friction, earth motion, and variations in acceleration a due to gravity (ignored by all to facilitate calculations). Bullet motion is motion with constant acceleration g which is directed downward, and there is no acceleration component in the horizontal direction.

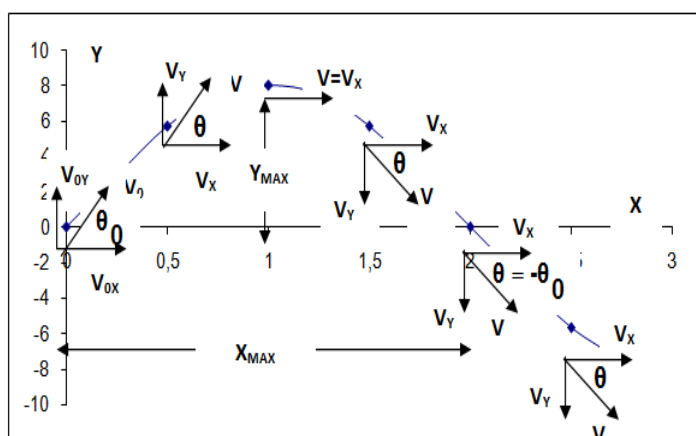


Figure 1. Parabolic motion with velocity components

On the X axis, the motion of objects is not influenced by the gravitational force so that it does not accelerate. In the vertical direction (Y axis) the motion experienced by objects is influenced by gravitational forces so that they experience deceleration or acceleration. Because the initial velocity of a parabolic motion forms an angle to a flat plane, the initial velocity is described in horizontal and vertical components. Vertical components are used to find the time of movement when in the air and the horizontal component is used to find the distance traveled. So that the equations obtained will be described on the X axis and Y axis in Table 1 below.

METHOD

Table 1. Motion Component for Parabolic Motion

No	Equation of X- axis directin motion	Equation of Y- axis directin motion
1	$V_{0x} = V_0 \cos \theta$	$V_{0y} = V_0 \sin \theta$
2	$V_x = V_{0x}$	$V_y = V_{0y} - g t$
3	$X = X_0 + V_{0x} t$	$Y = Y_0 + V_{0y} t - \frac{1}{2} g t^2$
4	$a = 0$	$a = -g$ (downward direction) $V_y^2 = V_{0y}^2 - 2 g h$

Scientific writing made by the author uses the method as shown in Figure 2 below.

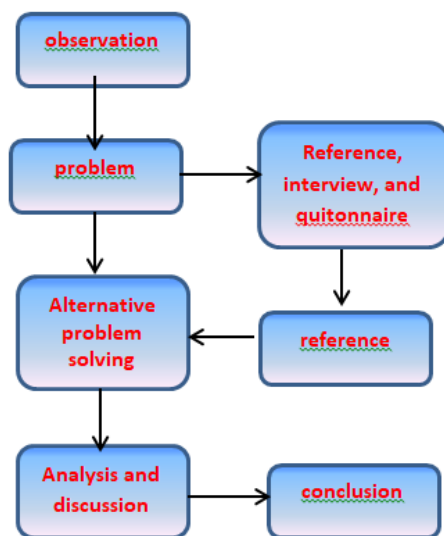


Figure 2. Writing Scheme

DISCUSSION

Making "jelonpro" interactive media requires tools and materials that are easy to obtain and easy to make which are shown in Table 2 and Figure 3 below.

Table 2. "Jelonpro" Interactive Media Tools and Materials

No	Name of tools and materials	Function	Quantity
1	Glass	as a material to record throw trail	2 pieces 35x65 cm ²
2	Magnet	as an adhesive between two glasses	2 pieces
3	Nuts	as a glass frame retaining device to prevent expanding	6 pieces
4	Bolt and Nuts	as a frame retaining	Sufficient amount
5	Aluminum	as a safety device for glass frames and holders (support)	Sufficient amount
6	Right Angle	as a frame holder	4 pieces
7	Hinge	as a gap regulator between two glasses	2 pieces
8	Marbles	as a projectile tool	1 piece
9	Tin suction	as a tool to throw (launcher)	1 piece
10	Coloring liquid	as ink material	Sufficient amount
11	Honey	as ink adhesive	Sufficient amount
12	Rubbing alcohol	as ink removal material	Sufficient amount
13	Tissue paper	as an ink removal tool	Sufficient amount
14	Protractor	as a measuring tool for angle	1 piece
15	Ruler	as a height and launch throw distance meter	1 piece
16	Stopwatch	as a timer	1 piece
17	Permanent board marker	as a tool to draw a trail of throws	1 piece
18	Transparent plastic	as a material to draw a trail of throws	1 piece with the same size as the glass frame





Picture 3. Jelonpro's Interactive Media Tools and Materials

The application of interactive media "jelonpro" in the learning process of the concept of parabolic motion uses two methods, i.e., experimentation and discussion. When using the media, it is equipped with RPP or *Rencana Pelaksanaan Pembelajaran* (Learning Implementation Plan) and LKPD or *Lembar Kerja Peserta Didik* (Student Worksheet) that have been provided. This is so that the teacher can easily use this simple experimental tool for learning parabolic motion. In addition, students are also easy to experiment by using a "jelonpro" experimental tool so that students understand more about learning parabolic motion.

The following is an explanation of the use of "jelonpro" interactive media in learning in a physics laboratory about parabolic motion. The teacher divides into 6

groups of 5 students for each group. The teacher explains how "*jelonpro*" interactive media works. Each group conducts experiments and discussions until presenting. The teacher acts as a facilitator, motivator, and conducts an assessment. Learners do their own experiments about parabolic motion and can observe how parabolic motion occurs in an object (projectile). Students are given the widest opportunity in conducting experiments on parabolic motion.

During conducting experiments on parabolic motion with "*jelonpro*" interactive media, students discuss each other's experimental data. The interaction of students in their groups will make them active and no one will stand idly by. The media "*jelonpro*" is also a means of observing, asking questions, collecting data, processing data, communication, and evaluating the learning process. Such learning conditions are very supportive of increasing motivation (motivation increasing) students in enjoying physics lessons especially parabolic motion and direct experience gained to develop competencies so that students are able to explore and understand the natural surroundings scientifically (Ministry of Education, 2006: 12). With this condition it allows students to demonstrate self-ability (self skills) in experimenting specifically parabolic motion.

The calculation used by students in data analysis is the equation of Straight Regular Motion (GLB or *Gerak Lurus Beraturan*) on the X axis and Regular Changed Straight Motion (GLBB or *Gerak Lurus Berubah Beraturan*) on the Y axis as terera in Table 1. Marbles that function as projectiles when thrown, are considered to roll perfectly ignoring friction that occurs between glass boards with marbles. Traces of projectiles (marbles) on glass boards can be recorded or redrawn by students in transparent plastic.

After conducting experiments and having discussion between groups, students present the results of the discussion in front of the classroom. Such activity can create learning conditions that are not monotonous. Students argue with each other to express opinions from the results of discussion group. Based on the results of experiments and discussion of the concept of parabolic motion, students can make abstract concepts to pragmatic matters.

CONCLUSION

The conclusions obtained in writing this scientific paper include:

- 1) Making a simple experimental tool, namely interactive media "jelonpro" is done by arranging tools and materials that are easily obtained from the surrounding environment in accordance with the drawing design tool.
- 2) The way to apply simple interactive media experiment tools "jelonpro" is to involve all students in the use of tools so that abstract physical concepts become real physical concepts assisted by LKPD, this is to facilitate students and teachers in conducting experiments.

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