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Preliminary analysis of learning resources for edupark in the matter rigid equilibrium by destination *Rumah Gadang Istana Rajo Balun* South Solok Indonesia

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Preliminary analysis of learning resources for edupark in the matter rigid equilibrium by destination *Rumah Gadang Istana Rajo Balun* South Solok Indonesia

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Abstract. Physics learning should integrate learning material with the environment so that physics learning becomes more interesting. Various kinds of learning resources that can be integrated into physics learning one of them are that the environment or educational park (EduPark). EduPark is an educational park to observe the application of physics concepts for students, for example, the destination of *Rumah Gadang*. It is the most visited place by many people, including students. However, the visits are only for playing, traveling, and taking pictures. Therefore, EduPark of destination *Rumah Gadang* has not been used as a learning resource. Based on the needs of students using teaching resources. It was conducted a preliminary analysis of learning resource and Physics materials that is potential in EduPark tourism destinations in the *Rumah Gadang*. This study used the Plomp development model at the preliminary research stage. The purpose of this study was to observe the physics concept based on EduPark *Rumah Gadang*. The data in this study were obtained from questionnaires and interviews with educators and students at SMAN 5 South Solok. The technique of data analysis was descriptive percentages. The result of preliminary analysis, it was found that there was a physics concept and the need to develop learning resources in the form of the book of EduPark books in the matter "rigid equilibrium" based on the destination tourism *Rumah Gadang* on Physics lessons at high school.

1. Introduction

Learning physics is a part of natural science that studies the environment in various forms of symptoms to observe, determine, and understand the surrounding environment. Physics learning resources should be integrated with the environment to make learning becomes more interesting. The standard process in learning in educational units must be held interactively, inspirationally, fun, challenging, and motivative, so the students can actively participate, and provide sufficient space for initiatives, creativity, and independence following the talents, interests and physical development psychological of students[1].

Various kinds of learning resources can be integrated into physics learning to realize process standards in educational units, including the environment or educational park (EduPark)[2]. EduPark is an educational park to observe the application of physics concepts such as the tourism destination *Rumah Gadang Istana Rajo Balun* South Solok, Indonesia. *Rumah Gadang Istana Rajo Balun* is the name for a *Minangkabau* traditional house located in South Solok Regency, West Sumatera Province, Indonesia. The *Rumah Gadang* is often referred to as *Rumah Bagonjong* or *Rumah Baanjung*[3].



Rumah Gadang was the tourism destination visited by most people, including the students. *Rumah Gadang Istana Rajo Balun* uses the concept of traditional houses, with the historical parks around it. Its position is very strategic and easy to reach. Its latitude is $1^{\circ}24'27.39''\text{S}$, its longitude line Buju is $100^{\circ}59'47.18''\text{E}$, and the distance from the Solok Town, West Sumatera is 110 km, that can be described through Figure 1 as follows:

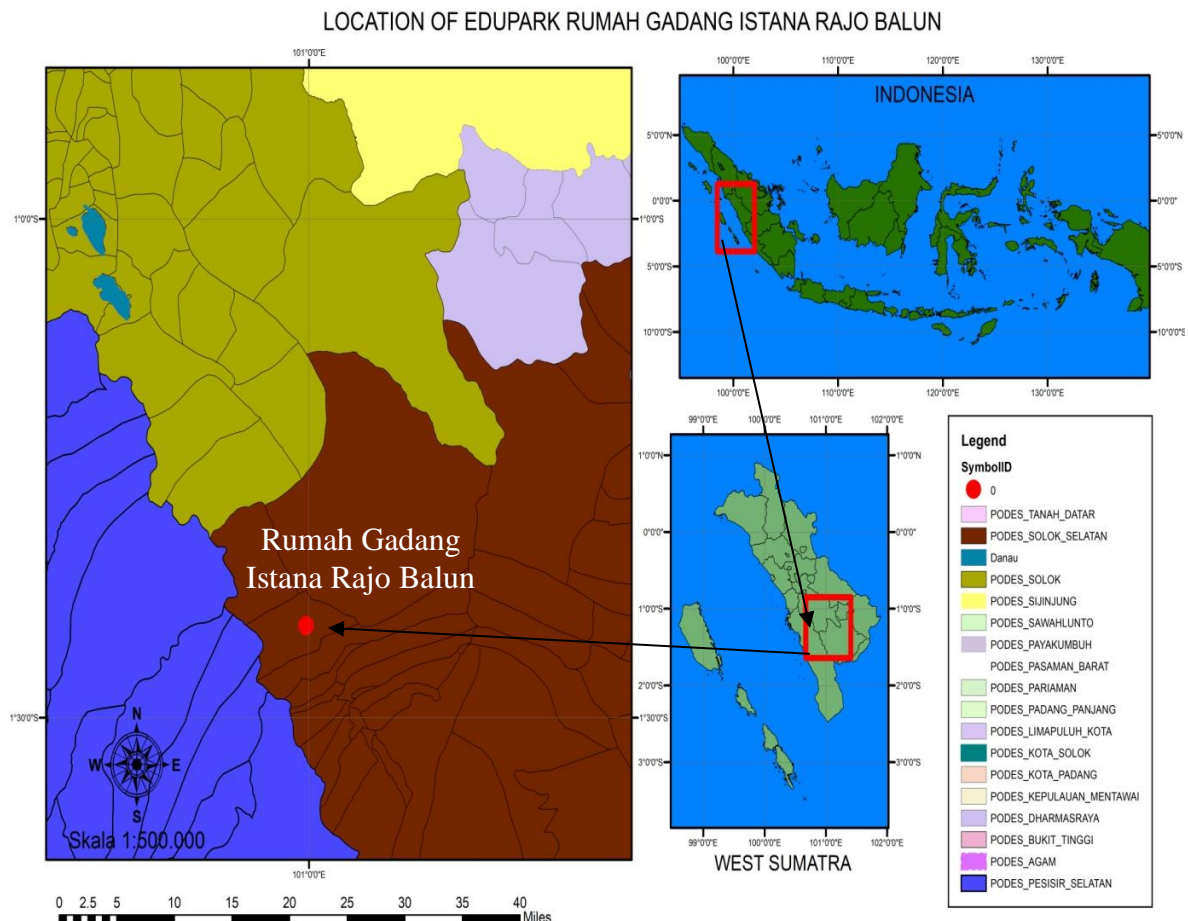


Figure 1. Map of Location for Edupark Destinations for Rumah Gadang Istana Rajo Balun

In 2017 the South Selatan Regency government has won the award as the most popular traditional village in the Indonesian charm award known as the "*Nagari Saribu Rumah Gadang*" as one of the world heritage cultural and the recognition of the regional context which still maintains the survival of the *Rumah Gadang* in the region[4]. *Rumah Gadang* gives the value of beauty and the concept of physics as the Edupark of the *Rumah Gadang Istana Rajo Balun* that shown in Figure 2:

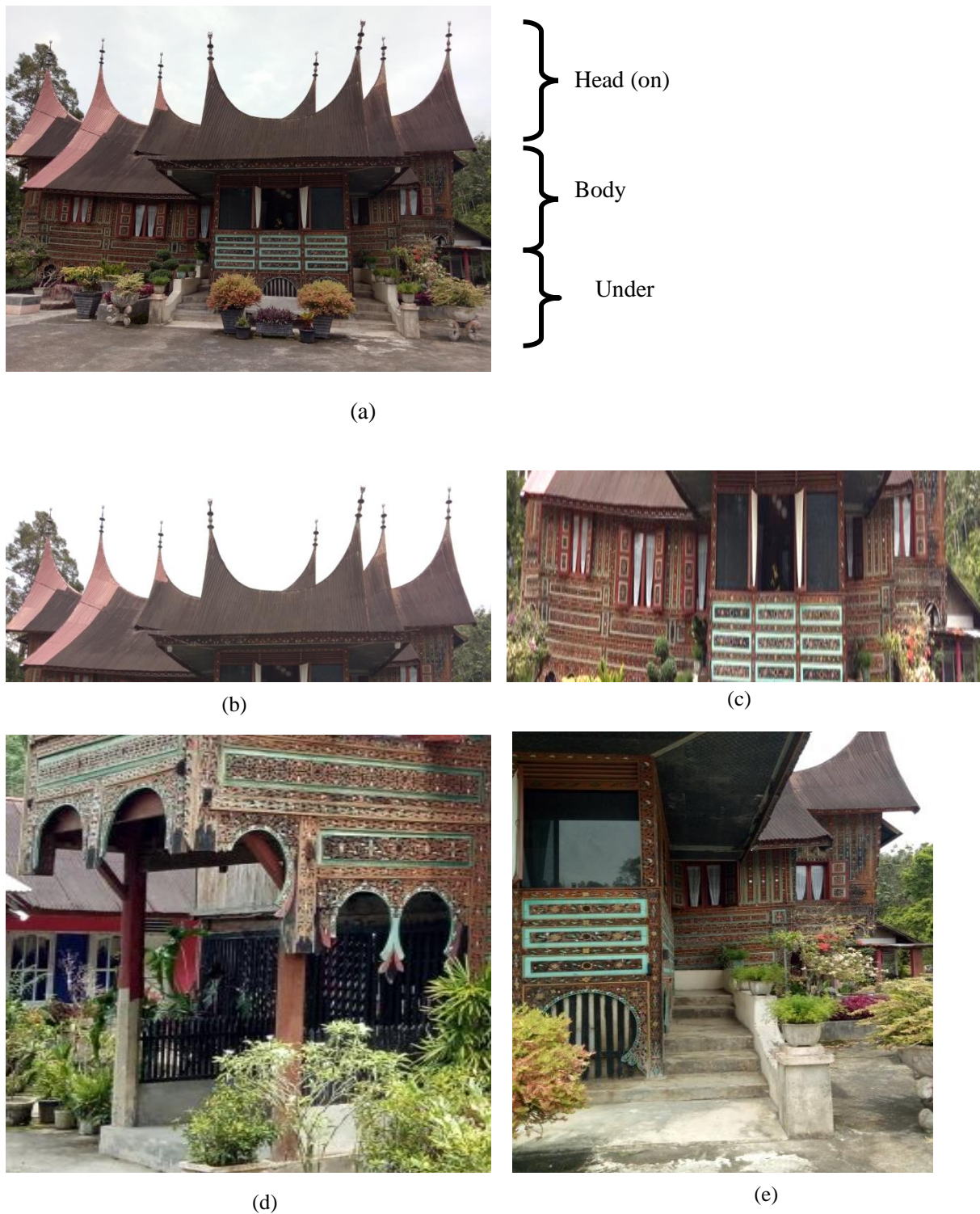


Figure 2. (a) Structural Houses Structure; (b) Roof of the *Rumah Gadang*; (c) Body of *Rumah Gadang*; (d) Legs of the *Rumah Gadang* without Foundation; (e) Level of *Rumah Gadang*

Figure 2 (a) *Rumah Gadang* has three important structures, namely the head, body, and under. The structure of the *Rumah Gadang* has many physics concepts that should be developed in learning through

teaching materials. The head (roof) part of the *Rumah Gadang* shows the *Minangkabau* characteristic that looks like a buffalo horn shown in figure 2 (b). Moreover, the roof of the *Rumah Gadang* has a physics concept about the slope and symmetrical fields. Figure 2 (c) shows that the *Rumah Gadang* has a trapezoidal body that curves and expands at the top. This body part has many windows on the front and sidewalls for exchanging the air and receipting of incoming light. Indirectly, the *Rumah Gadang* has applied the physics concept of light and air circulation (heat transfer). In the room of the *Rumah Gadang* there is an *anjuangan* that is usually used for the kings to sit. From *anjuangan*, the king can observe all the people inside such as the physics concept of optical instruments in the eyes and cameras.

Figure 2 (d) is the pole part of the *Rumah Gadang* that can be seen from the outside. The foundation of the *Rumah Gadang* is only a stone placed on the ground, without being planted or attached to cement. However, this pole has a very large pressure that can withstand the burden of the house. *Rumah Gadang* has stairs to enter the house. The function of these stairs is to make it easier for the visitors to enter the house which shows the physics concept about the slope shown in Figure 2 (e). Overall, the building of the *Rumah Gadang* has the concept of equilibrium from the foot to the roof of the *Rumah Gadang* as shown in Figure 3.

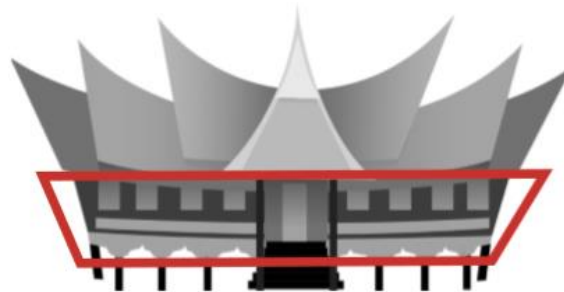


Figure 3. Form of Equilibrium from the *Rumah Gadang* building

Thousands of tourists have visited the *Rumah Gadang*, but the purposes of visitors are only playing, traveling, taking a picture, and having a vacation. So that Edupark tourism destination *Rumah Gadang* has not been used as a learning resource. To analyze the needs of the student to this learning resource it was necessary to do a preliminary analysis of learning resource and Physics materials in Edupark tourism destinations in the *Rumah Gadang Rajo Balun*. Some of the physics concepts found in Edupark tourist destinations *Rumah Gadang Rajo Balun* were the equilibrium of objects, inclined planes, Newton's laws of force and gravity, effort and energy, heat transfer, and pressure.

Rumah Gadang is unique because it is made without a foundation like an ordinary house. It has a building structure that is wide upwards, in contrast to ordinary buildings. This structure is the application of equilibrium object concept. Other Eduparks that can be used as learning resources are *Janjang Seribu*[5], *Mifan Padang Panjang*[6], *Ngarai Sianok*[7], *Lembah Harau*[8], *Semurup Hot Water*[9], and school parks[10].

2. Methods

This type of research is research and development. The development model of this research is the Plomp development model, consisting of three phases: 1) preliminary research (preliminary), 2) prototype phase (design), and 3) assessment phase (assessment) [11]. This development model can solve the problem under study because it can help in directing research to work systematically. This limit of this research is the preliminary research stage, which is the preliminary stage to define and collect information, analyze information, define problems and project continuation.

The variables analyzed in this preliminary analysis were teaching resources and topics in Physics learning that relevant to Edupark tourism destinations *Rumah Gadang Istana Rajo Balun*. Analysis of learning resources was done by analyzing the teaching materials used by educators and students in the learning process. Topics analysis was done by analyzing the basic competencies of Physics learning in Senior High School. The data analysis technique used was descriptive quantitative and qualitative

statistical analysis techniques. The quantitative descriptive technique was done by dividing the score obtained with the ideal score then multiplied by 100%. So that it can be expressed in equation 2.1 [12]:

$$V = \frac{X}{Y} \times 100\% \quad (2.1)$$

Information:

V = Final Value

X = Score obtained

Y = Maximum score

The percentages obtained quantitatively are then categorized qualitatively as where at Table 1.

Table 1. Percentage on category distribution

Percentage	Category
76-100	Well
51-75	Enough
26-50	Not Good
0-25	Bad

The data in this study were obtained from questionnaires and interviews with educators and students at SMAN 5 South Solok. The purpose of the interviews conducted was to know of the learning process. Data analysis used descriptive percentages techniques. Analysis of the material was carried out directly related to Edupark, the destination of the *Rumah Gadang Istana Rajo Balun, Koto Parik Gadang Diateh* District, South Solok Regency, West Sumatera Province, Indonesia.

The result of interviews identified the issues by educators in learning and the results of the analysis of teaching resources used to study teaching and learning resources used in learning. The result of observations and analysis of this material are used to determine the potential of the environment (tourist attractions *Rumah Gadang Istana Rajo Balun*) which is connected with Physics learning material.

3. Result and Discussion

3.1. Result of Questionnaire Analysis

The completion of the questionnaire on the analysis of educators towards learning physics was carried out on June 14, 2019. The Physics Educators of SMAN 5 South Solok numbered three people. Based on the questionnaire analysis on educators, it was obtained as shown in Table 2.

Table 2. Educator Analysis on Learning Resources and Teaching Materials

Aspect	Percentage	Category
Educators have not made printed teaching materials	66.77%	Enough
Educators visit edupark (tourist attraction) with students in the process of learning physics	0%	Bad
Educators use teaching materials	66.77%	Enough

Table 2, it can be concluded that educators have not made teaching materials personally and educators have never implemented a learning system sourced from tourism objects (edupark). Educators still use existing teaching materials. The results of interviews conducted with educators, things that cause educators have not been able to make teaching materials due to limited ability and very dense work so that the teaching resources used are still dependent on existing teaching materials.

The source of learning is the power that is used for the benefit of learning, both directly and indirectly, partially or as a whole [13]. So, learning resources are a guideline used by educators and students in obtaining much information, knowledge, and skills in the learning process. One of them is teaching

resources in the form of teaching materials using books that integrate with edupark (environment) according to the regional context in high school physics learning.

The analysis carried out to students using questionnaires. Students involved in class XI of SMAN 5 South Solok were thirty-five people, shown in Table 3.

Table 3. Analysis of Students.

Aspect	Percentage	Category
<i>Knowledge</i>		
Physics phenomenon in the environment	54.29	Enough
Regional Context	32.86	Not Good
Technology development	56.42	Enough
Benefits of Physics	60.71	Enough
Natural phenomena with the concept of physics	55.71	Enough
Technology with the concept of physics	57.14	Enough
Regional context with the concept of physics	33.57	Not Good
<i>Learning Style</i>		
like learning with lecture and discussion methods	50	Not Good
like learning by using the practice method	60	Enough
respond when the teacher demonstrates learning	58.57	Enough
utilize tourist attractions as learning	27.14	Not Good
<i>Motivation</i>		
have the motivation to learn tourist lessons (edupark)	76.42	Good
<i>Learning Resources</i>		
Book (Student Book)	74.28	Enough
Textbook	38.57	Not Good
Module	25	Bad
Student Worksheet	71.42	Enough
Handout	26.42	Not Good
ObjekWisata (Edupark)	25	Not Good

The Table 3 about analysis of students it can be concluded that students still have low knowledge related to physical phenomena in the environment 54.29%, regional context 32.86%, technological development 56.42% and physics benefits 60.71%. Meanwhile, aspects of student learning styles still tend to be low because students have not used tourism objects (edupark) in physics learning 27.14%.

Unlike the motivation of students to learn lessons through tourist objects (edupark) is very high at 76.42. While the aspects of learning resources that have not been used are still relatively low, namely using tourist objects (edupark) with a percentage of 25%. So, using tourism objects (edupark) needs to be developed in physics learning.

The physics learning process still takes place in class and laboratory. Educators are more dominant in learning compared to the activity of students. Educators and students have not utilized the regional context around the school as a learning resource. One of the regional contexts around the school can be used as a learning resource in the form if a tourist attraction. An attraction not only as a place to visit tourists, but attractions can provide educational value called edupark. Edupark (educational park) can be used as a learning resource such as the *Rumah Gadang Istana Rajo Balun*, which isn't far from the

SMAN 5 South Solok. The distance to school with Edupark *Rumah Gadang Istana Rajo Balun* is 3.5 km \pm 5 minutes.

3.2. Result of Material Analysis and Field Observation

Based on the material analysis conducted on Edupark tourist destination *Rumah Gadang Istana Rajo Balun*, several high school physics concepts were found as shown in Table 4.

Table 4. Analysis of Physics Materials based on Edupark *Rumah Gadang Istana Rajo Balun South Solok*, Indonesia

Expected Competency	Topic
Analyze the concepts of energy, business (work), business relations (work) and changes in energy, the law of conservation of energy, and its application in everyday events	1. Energy and Power Business
Applying the concept of torque, moment of inertia, the center of gravity, and angular momentum in rigid objects (static and dynamic) in everyday life, for example in sports	2. Equilibrium
	3. Moment of Inertia
	4. Weight and mass of objects (symmetrical)
Analyze the effect of heat and heat transfer which includes the thermal characteristics of a material, capacity, and heat conductivity in everyday life	5. Inclined plane
	6. Heat Transfer
Analyzing interactions in style and the relationship between force, mass and straight motion of objects and their application in everyday life	7. Newton's Law (Friction Force)
	8. Newton's Second Law
Analyzing the regularity of motion of planets and satellites in the solar system based on Newton's laws	9. Newton's Law of Gravity
Analyze the nature of the elasticity of materials in everyday life	10. Elasticity
	11. Pressure
Analyzing the workings of optical devices using reflecting and refracting properties of light by mirrors and lenses	12. Eyes and glasses

4. Conclusion

Learning physics at SMAN 5 South Solok is still far from the standards and demands of the curriculum. Learning is still centered on educators. Learning is still centered on educators. Lack of integration of students with the environment and regional context (Edupark) related to the subject matter being studied. Learning resources are less varied. Educators have not been able to create and design a teaching resource due to limited ability to use computer technology. Besides, educators have never been to invite students to visit tourist destinations (edupark) in the process of learning physics. However, educators and students have a desire to learn through Edupark. Various physical materials can be integrated with the concept of Edupark at *Rumah Gadang*. One of the solutions to the problems contained in the analysis of interviews, analysis of teaching materials, analysis of materials and environmental conditions *Rumah*

Gadang Istana Rajo Balun requires teaching resources in the form of textbooks based on tourist destination edupark *Rumah Gadang Istana Rajo Balun* designed according to the curriculum.

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