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Preliminary Analysis of the Physics Enrichment Book Design-Edupark Hot Waterboom Solok Selatan Integrated Inquiry Learning Model

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ABSTRACT

Hot Waterboom Solok Selatan is one of the tourist destinations that is often visited by people on vacation. However, visits to these attractions are only for traveling, taking pictures, and playing. They do not realize that tourist attractions can also be used as learning resources. This study aims to determine the needs of teaching materials that are in accordance with the background of students and their environment. This research is a preliminary study of the research and development method using the Plomp model, which consists of student analysis, teacher analysis, and analysis of physics concepts. The data in this study were obtained from the results of needs analysis through interviews with two physics teachers and 38 students at SMAN 3 Solok Selatan. The results obtained from the students' environment, there is a tourist attraction, namely Hot Waterboom Solok Selatan. After direct observation to the tourist attraction, many physics concepts were found. From the results of the learning style questionnaire, students are more dominant visual learning style, so suitable teaching materials in the form of print media such as books. From the results of teacher interviews, the teaching materials used have not been integrated with eduparks and have not been equipped with learning models. The inquiry learning model is a model that is in accordance with the independent curriculum because learning is student centered and involves students actively discovering concepts. Based on the curriculum analysis, it is found that the physics materials on tourist attractions are not ordered, so the type of book that is suitable is an enrichment book. Enrichment book is a flexible type of book because it does not depend on the curriculum. It can be concluded that it is necessary to design a physics edupark enrichment book Hot Waterboom Solok Selatan integrated Inquiry Learning model for senior high school students.

Keywords: *Enrichment Book; Edupark; Inquiry Learning*

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I. INTRODUCTION

Physical science is crucial to many contemporary inventions and aids in the explanation of numerous everyday occurrences [1]. In learning physics, students learn physical concepts, laws, and theories that help them understand and explain natural phenomena. However, high school students view physics as a difficult, scary subject, learning in class is less fun and boring. Teachers have a professional obligation to foster an engaging, enjoyable, creative, dynamic, and dialogical learning environment [2]. In physics learning, a mature understanding of concepts is needed so that students can solve a problem in physics learning well [3]. Therefore, it is expected that an educator needs innovation in learning.

As part of its endeavors to enhance educational standards, the government created a novel curriculum known as the independent curriculum. The independent curriculum is understood as a type of instruction that gives students the chance to demonstrate their innate abilities while learning in a calm, carefree, enjoyable, and stress-free environment [4]. The implementation of the independent curriculum is slowly progressing. The concept of an independent curriculum is student-centered learning. The independent curriculum can emphasize experiential learning, where students are invited to learn from direct experience in nature. This can include visits to nature exploration sites, and field learning.

Learning outside the classroom will provide greater opportunities for students to discuss with the teacher. Learning outside the classroom will shape the character of students both in the courage to express

opinions during discussions, the ability to get along well, become com petent students so that by itself the character of students is increasingly formed [5]. One form of learning outside the classroom is to utilize the surrounding nature as a learning resource. Revolution 4.0 which demands a variety of learning resources in line with the challenges of globalization by utilizing the potential of the area around students that can be used as a learning resource.

Regional potential itself has a very broad meaning. Because students are involved in direct learning when they observe, listen, ask, collect data, associate, or analyze something, and then communicate what they learn [6]. Especially for physics learning, phenomena that exist in nature and the surrounding environment can be utilized as a learning resource. The use of nature as a learning medium has an impact on student motivation and interest in learning, student learning outcomes are also classified as good when using nature as a learning medium [7]. One form of innovation in learning resources from nature is to make natural attractions as a source of learning.

Tourism objects that are utilized as learning resources are commonly referred to as education park (edupark). The idea that physics is a dry, hard, monotonous, and inflexible subject is changed when eduparks are used as a learning resource with both natural and man-made attractions. Instead, physics can be learned in an engaging environment. [8]. So that students can learn physics while recreating [9]. Some examples of eduparks are Padang Beach Tourism [10], Bayang Sani Waterfall in South Pesisir [11], Chinangkiek Bukik Park [12], Sianok Gorge [9], Mifan Waterpark in Padang Panjang [13], Janjang Seribu and Gunung Merah Putih in Sulit Air [14], Harau in Lima Puluh Kota Regency [15], Semurup Kerinci hot spring [16], Rumah Gadang Istano Rajo Balun, South Solok [17], Gua Rantai and Gua Danau [18], and Gua Loguang [19].

These days, going to natural and artificial attractions for leisure has become a weekend ritual for everyone. In addition, these venues are frequently utilized for business meetings, social gatherings, and photo ops for the younger generation, who then post the images to social media [16]. Without realizing it, these natural and artificial attractions contain many physics concepts that can be used as a learning tool. One example of an edupark that can be utilized by students as a learning tool is the Hot Waterboom Solok Selatan tourist attraction.

One method to integrate nature exploration into physics learning is by integrating it into physics enrichment books [20]. Enrichment books are non-text books as support in the learning process used by students [21]. Enrichment books will position students to gain additional knowledge from reading these books which in textbooks are not obtained more complete and extensive knowledge information as contained in enrichment books [22]. The main role that can be done by teachers is to create enjoyable learning, namely with interesting teaching methods. The Inquiry Learning model can be a reference for teachers to be able to implement independent learning [23].

The Inquiry Learning model comes from the word Inquiry or seeking information, so that in this learning process students are asked to investigate certain material through the stages of searching or finding themselves. Inquiry learning can raise students' curiosity and motivate them to continue learning until they find answers [24]. This model places educators as facilitators and motivators in the learning process. The advantages of the Inquiry model that make this model good and in accordance with the world of education now and focus on building knowledge, attitudes, and skills and provide learning opportunities according to the learning style of the students themselves [25]. The Inquiry Learning model is suitable for problem solving in physics learning. With this model students are required to be active in learning. Physics learning is not only obtained from the classroom, but also outside the classroom.

Hot Waterboom Solok Selatan is a tourist attraction located in Sapan Maluluang, Nagari Pauh Duo Nan Batigo, Pauh Duo District, South Solok Regency, West Sumatra Province. For more details, the location map of Hot Waterboom South Solok can be seen on the map Figure 1.

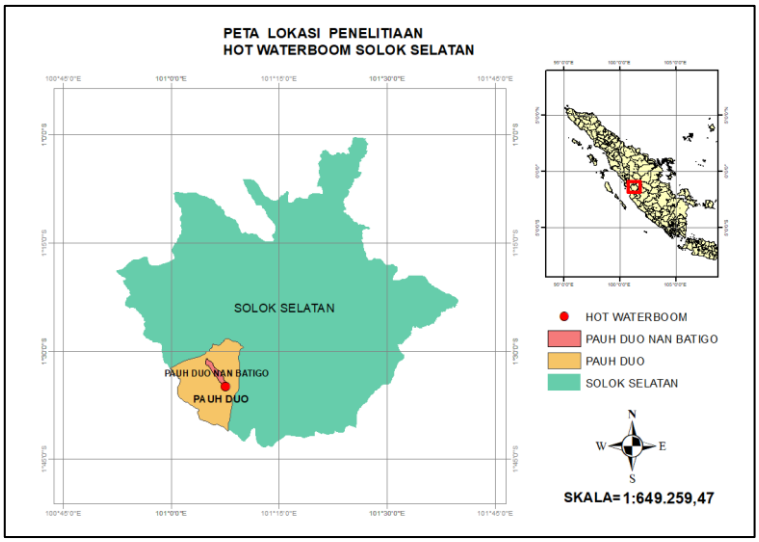


Figure 1. South Solok Hot Waterboom Research Location Map

Hot Waterboom Solok Selatan can be used as a place to play while learning by students. There are various rides that can be enjoyed, including one large swimming pool for adults, two swimming pools for children equipped with rides such as slides and spilling buckets. In addition, there are two medium therapy pools, one shallow therapy pool, and a hot spring pool for boiling eggs. This tourist attraction can be used as a place to travel and play by local residents, but can also be used as a learning arena while playing by students.

The research to be carried out is to design teaching materials that are in accordance with the background of students' needs in learning. Therefore, a preliminary study is very important. It consists of field studies and literature studies. Field study or direct observation aims to find out the condition of learning in schools and the condition of tourist objects that allow it to be used as a good learning resource. The methodical documentation of conditions, occurrences, and items seen in the research object is known as observation [26]. Literature study aims to collect data and information according to what will be researched. The purpose of this research is to find out the learning resources used by teachers, obstacles in the field, and learning resources needed by students.

II. METHOD

This study uses the Plomp model for research and development [27]. The three stages of Plomp's development model are: 1) Preliminary Research; 2) Development/Prototyping Phase; and 3) Assessment Phase. This development model instructs researchers to follow a methodical approach in order to address the research problem. This research is just in its early stages of investigation, which are information gathering and analysis, problem identification, and product design.

$$Index\ formula\ \% = \frac{Total\ Score}{Y} \times 100\% \qquad (1)$$

The percentage obtained quantitatively is then categorized qualitatively as in Table 1.

Table 1. Percentage Category division

Percentage	Category
76-100	Good
56-75	Fair
40-55	Less
<40	Poor

Data collection techniques included interviews, observations, and analysis of physics materials. The research was conducted in February 2023. The research subjects were 2 physics teachers and 38 students of

SMAN 3 Solok Selatan, while the research object was Hot Waterboom Solok Selatan. In Plomp's development stage, needs analysis was developed based on indicator analysis using a data collection questionnaire distributed directly to students as well as interviews conducted to two physics teachers of SMAN 3 South Solok, which aims to get an overview of the teacher's procedures in carrying out the learning process for students.

In order to establish the Hot Waterboom Solok Selatan tourist attraction as an edupark for physics learning, physics concepts were analyzed using descriptive methods and the Concepts Fitting Technique [20]. Both observation and reading literature are used to gather data. The rides at Hot Waterboom South Solok were observed firsthand and then corresponded with curriculum-based physics content. 1) Analyzing physics material to be integrated and obtaining concepts; 2) Analyzing the environment and obtaining concepts; 3) Analyzing edupark derived from the environment; and 4) Generating physics material integrated with Hot Waterboom by matching pertinent concepts are the stages of the Concepts Fitting Technique. 5) Edupark Hot Waterboom Solok Selatan by means of studying physics. Figure 2 is illustrates the Concepts Fitting Technique phases.

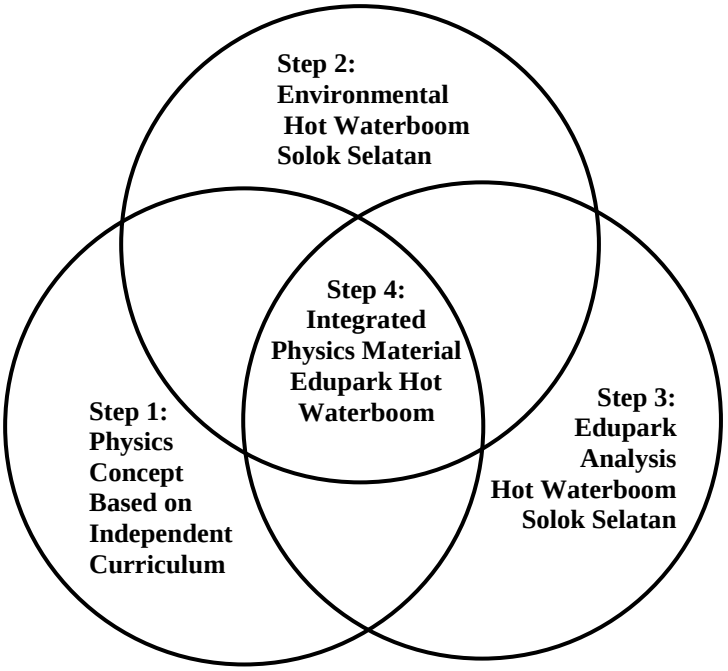


Figure 2. Steps to Analyze Hot Waterboom Edupark with Concept Fitting Technique

III. RESULTS AND DISCUSSION

The results of the analysis of questionnaires distributed to students at SMAN 3 Solok Selatan about learning styles can be seen in Figure 3.

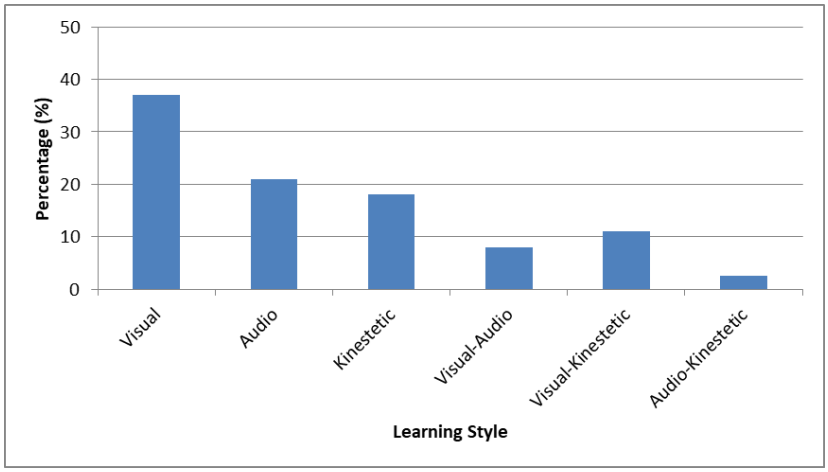


Figure 3. Results of Student Learning Style Questionnaire

Learners who have the most dominant learning style are visual learning styles at 37% where they rely on vision as a recipient of information and knowledge. The visual learning style helps students focus their attention and concentration on the material being studied through seeing, looking at, or observing the subject matter [28]. The learning process of students with visual learning styles can be assisted by printed media in the form of learning books, learning modules, and teaching materials. This is in line with research conducted by M. Julee Tanner (2014) that print media or printed books are learning media in schools that best suit the optical, cognitive, and metacognitive needs of the reader's brain [29].

Then the results of a questionnaire from students consisting of 4 aspects, namely student interest in using teaching materials made by teachers themselves, visits to tourist attractions, utilization of tourist objects as a learning resource, and student knowledge about physics learning with tourist objects.

Table 2. Analysis of Learning Aspects

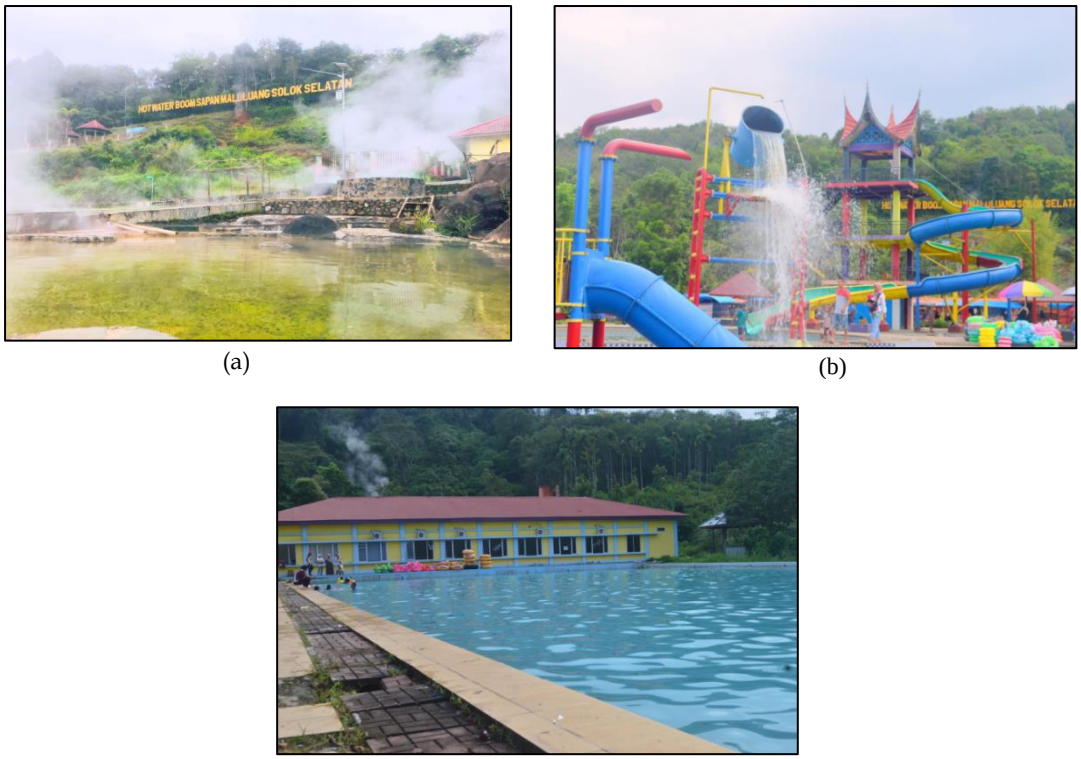
Aspects	Presentase
Students' interest in using teaching materials made by teachers themselves	81
Visit to tourist attraction	86
Utilization of tourist attractions as a learning resource	40
Students' knowledge about physics learning with tourism objects	50

Based on the data in Table 2, it is known that students have difficulty in understanding physics material in the package book by 81% with a good category, meaning that students understand better the teaching materials made by the teacher. Furthermore, in the aspect of visits to tourist attractions, the results show 86% because of the enthusiasm of students in visiting tourist attractions, this is evidenced based on interviews with Hot Waterboom attraction officers who say this tourist attraction is visited by many students. However, they visit only to play and take pictures, without realizing that there are many physics concepts in the rides on the attraction that can be used as a source of physics learning. Furthermore, the utilization of tourist attractions as a learning resource shows 40% with a less category. The percentage results show that students do not know the tourist attraction can be utilized as a learning resource. Then on the aspect of students' knowledge about physics learning with tourist objects shows the results of 50% with the category less. The percentage results show that there is still a lack of student knowledge about physics learning with tourist objects or eduparks, so the utilization of eduparks in the learning process is needed. Learning that is integrated with the surrounding nature can invite students to identify and explore related concepts, and challenge students to reveal physics concepts to everyday life [30]. Learning physics associated with real phenomena makes physics meaningful, and fun for students because what is learned is really around them.

The results of interviews with 2 physics teachers at SMAN 3 Solok Selatan, it is known that the school has implemented an independent curriculum. The implementation of the curriculum has been implemented in accordance with the guidelines provided by the ministry. In the learning process, the learning model used by teachers is the Problem Based Learning model. However, the teaching materials used have not applied the learning model. The teacher's obstacles during the learning process are insufficient learning time and lack of student interest in learning.

In order to establish the Hot Waterboom Solok Selatan tourist attraction as an edupark for physics learning, physics concepts were analyzed using descriptive methods and the Concepts Fitting Technique [20]. Both observation and reading literature are used to gather data. The rides at Hot Waterboom South Solok were observed firsthand and then corresponded with curriculum-based physics content. 1) Analyzing physics material to be integrated and obtaining concepts; 2) Analyzing the environment and obtaining concepts; 3) Analyzing edupark derived from the environment; and 4) Generating physics material integrated with Hot Waterboom by matching pertinent concepts are the stages of the Concepts Fitting Technique. 5) Edupark Hot Waterboom Solok Selatan by means of studying physics. Figure illustrates the Concepts Fitting Technique phases.

As a result of the examination of the learning environment, a tourist destination exists, namely Hot Waterboom Solok Selatan. After direct observation to the tourist attraction, many physics concepts were found. The utilization of edupark as a learning resource can be done by identifying physics concepts in the Hot Waterboom South Solok tourist attraction. The South Solok Hot Waterboom attraction has a hot water pool, swimming pool, slide, and spilled bucket. For more details can be seen in Figure 4.



(a) (b) (c)

Figure 4. Game Rides at Hot Waterboom Solok Selatan (a) Hot Water Pool, (b) Slide and Spilling Bucket, (c) Swimming Pool

The form of identification of physical concepts in the Hot Water Pool of South Solok Hot Waterboom is described in Table 3.

Table 3. Physics Concepts of Hot Water Pools

Physics Concepts	Explanation
Temperature and Heat	• Temperature is a quantity that expresses the degree of hotness or coldness of a substance or object. In a hot pool, the water temperature will be higher than the surrounding air temperature. • When two objects are brought together or come into contact, heat is the energy that transfers from the higher-temperature object to the lower-temperature object. In a pool of hot water, heat will flow from the hotter water to the cooler air.
Density	Density is a quantity that expresses the mass of an object per unit volume. In a hot pool, the density of water will be higher than the density of air.

Based on the Hot Waterboom tourist attraction, there is also a swimming pool which also has related physics concepts. The identification of physics concepts in the swimming pool is described in Table 4.

Table 4. Identification of Physics Concepts in Swimming Pools

Physics Concepts	Explanation
Newton's 1st Law	• According to Newton's 1st Law, every body or object has a tendency to remain at rest or move at a constant speed in the same direction, unless there are external forces acting on it. In the context of swimming, this means that a swimmer will remain moving at a constant speed in water if there are no external forces affecting them. According to Newton's Second Law, the force acting on an object is the result of the mass of the object multiplied by its acceleration. In the case of swimming, the pushing force generated by the swimmer while swimming must be greater than the resistance force generated by the water to accelerate movement. • Newton's third law states that every action has a reaction that is proportional and opposite in direction. When a swimmer pushes the water backward with his hand, the water will exert a comparable reaction force to the swimmer, pushing him forward. This is the basic principle used in swimming.
Energy	• Potential energy in swimming pools involves the deviation of energy associated with the position or height of water in the pool. When visitors prepare to swim or start swimming, thus storing energy and potential energy.
static fluid	• Swimming pools have density • Hydrostatic pressure is the pressure generated by a stationary fluid due to the downward weight of the fluid. In the context of swimming pools, hydrostatic pressure can affect the stability and strength of the pool walls. • Archimedes' law states that the buoyant force experienced by an object immersed in a static fluid is equal to the weight of the fluid displaced by the object. In the context of swimming pools, this law means that the buoyant force experienced by a human body when swimming in a swimming pool is equal to the weight of the water displaced by the human body. In a swimming pool, a buoy floats because it has a density that is smaller than the density of the fluid..

Furthermore, there is a slide ride that must be tried when visiting the Hot Waterboom Solok Selatan tourist attraction. The identification of physics concepts on the slide rides can be described in Table 5.

Table 5. Identification of Physics Concepts in Slide Rides

Physics Concepts	Explanation
Circular Motion	The concept of circular motion can be applied to the slide by paying attention to the movement of the slide users who form a circular trajectory. The slide here has a winding trajectory, visitors will feel spun around until they get to the end of the slide and end up in the swimming pool. The motion of the visitor while sliding is an example of circular motion.
Newton's Law	• The first law of motion, known as Newton's First Law, states that if an object is not subjected to a force then it will remain at rest or move in a straight line. In the context of slides, this law can be applied to understand the motion of the slide user when there is no force acting on the slide user. • According to Newton's Second Law, an object is accelerated by a force that is directly proportional to the strength of the force and inversely proportional to the mass of the object. In the context of slides, this law can be applied to understand the relationship between the force acting on the slide user, the mass of the visitor, and the acceleration of the slide.
Friction Force	Friction is a force that impedes the motion of an object through a surface. Water slide rides are often coated with slippery materials or have smooth surfaces to reduce friction between the user's body and the slide surface. This allows the user to slide more smoothly and quickly.
Work and Energy	• Work can be calculated by multiplying the force exerted on the user of the slide by the distance traveled by the user of the slide. • Potential energy, potential energy is related to the height of the slide user from the ground or other reference point. The higher the slide user's position from the surface, the greater the potential energy. • Kinetic energy, kinetic energy is related to the speed of the user of the slide. The faster the user slides, the greater the kinetic energy. • Mechanical Energy, potential energy can turn into kinetic energy when the user starts sliding. As the user slides down, their potential energy decreases while their kinetic energy increases. This follows the law of conservation of energy, where the total mechanical energy (potential energy+kinetic energy) is always constant if there is no non-conservative force acting..
Rotational Kinetic Energy	The concept of rotational kinetic energy can be applied to slides by considering the motion of the slide user which involves rotation. Rotational kinetic energy occurs when an object rotates. In slides, rotational kinetic energy is related to the rotational motion that occurs to the user when sliding.

Furthermore, there is a fun spill bucket ride. The identification of physics concepts contained in the spilled bucket ride is described in Table 6.

Table 6. Identification of Physics Concepts in Spilled Bucket Rides

Physics Concepts	Explanation
Free fall motion	In the case of a spilled bucket, the water in the bucket will experience free fall motion when the bucket spills. The factor that affects the free fall motion of water is the acceleration caused by the gravitational pull of the earth, neither the mass of water nor the air resistance has any effect..
Parabolic Motion	The trajectory of the water spilled in the spilling bucket is a parabolic trajectory
Balance	When the water in the bucket is filled with water until it reaches a certain limit, the bucket cannot hold the balance, so the water in the bucket will spill. Then the bucket returns to its original position due to the balance.
Work	When the water comes out of the bucket and falls, the work that occurs on the bucket is to convert the potential energy of the water into kinetic energy.
Energy	• The energy that an object possesses as a result of its position is known as potential energy. In a spilled bucket, the potential energy is gravitational potential energy because the bucket has mass and is at a certain height. • Kinetic energy is the energy that an object has because it is moving. In the spilled bucket, kinetic energy occurs when the bucket spills and the water inside the bucket moves or spills. • The total of an object's kinetic and potential energy is known as mechanical energy. In a spilled bucket, that energy is made up of the kinetic energy of the water coming out of the bucket and the gravitational potential energy of the water in the bucket before it spilled.
Debit	The water discharge in a spilling bucket is the amount of water that comes out of the bucket in a certain unit of time.

Based on the analysis of students' learning styles, which are dominant with visual learning styles, the appropriate teaching materials are printed media. From the results of teacher interviews and student needs analysis, the problems during the learning process are lack of time and lack of student interest in learning. And the teaching materials used by teachers have not been equipped with learning models and have not integrated regional potential. The use of inappropriate learning models in the learning process causes boredom or saturation, lack of understanding of concepts, and monotonous learning can cause students to be less motivated to learn [31].

The results of the analysis of the student's environment, obtained the Hot Waterboom South Solok tourist attraction which can be used as an edupark. After direct observation to the tourist attraction, many physics concepts were found. Based on the curriculum analysis, it is found that the physics materials in the tourist attraction are not sequenced, so the type of book that is suitable to be made is an enrichment book. Enrichment books are books that contain material that can enrich textbooks at the primary and secondary education levels. Enrichment books serve to improve students' thinking skills and broaden students' horizons about the environment based on current knowledge. In particular, enrichment books can improve students' knowledge, skills, and personality insights [32].

Based on the physics concepts obtained, it will be poured into the physics edupark enrichment book Hot Waterboom Solok Selatan. Enrichment books that can be used as learning resources that can support the learning process [33]. Enrichment books are expected to improve students' thinking skills, as well as broaden their insights into the environment based on the latest knowledge. In addition to good substance content, enrichment books must also be presented in a fun way in order to foster students' interest in reading [34]. Enrichment books are flexible, meaning they can be used in the long term. Even if the curriculum is updated later, edupark-based enrichment books can still be used because they are not related to the curriculum. In the independent curriculum, enrichment books are needed as context differentiation.

IV. CONCLUSION

Based on the results of the needs analysis conducted at SMAN 3 Solok Selatan, it can be concluded that in the learning process, the school has implemented an independent curriculum. From the analysis of the student environment there is a tourist attraction, namely Hot Waterboom Solok Selatan. After direct observation to the tourist attraction, many physics concepts were found. From the results of the learning style questionnaire, it is known that students are more dominant with visual learning styles, so that suitable teaching materials are printed teaching materials. From the results of teacher and student interviews, the teaching materials used have not been integrated with eduparks and have not been equipped with learning models. Based on the curriculum analysis, it is found that the physics materials in the tourist attraction are not sequenced, so the type of book that is suitable is an enrichment book. The independent curriculum requires students to be active in learning and students. The inquiry learning model is a learning model that actively involves students in discovering concepts, principles, or laws. So this model is suitable to be associated with edupark-based learning. Based on the needs analysis, it is necessary to design an enrichment book for the South Solok Hot Waterboom physics edupark integrated with the Inquiry learning model for students.

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