



## Analysis of Design Needs for the Integrated Project-Based Learning Module at Edupark Physics Science and Technology Center Sawahlunto

Adji Waskita<sup>1</sup>, Hamdi Rifai<sup>1\*</sup>, Fatni Mufit<sup>1</sup>, Gusnedi<sup>1</sup>

<sup>1</sup>Department of Physics, Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Padang 25131, Indonesia  
Corresponding author. Email: [adjiwaskita50@gmail.com](mailto:adjiwaskita50@gmail.com)

### ABSTRACT

Visiting tourist attractions has become a custom for the community, but the visit is still a holiday, and the activity is not more for recreation, just like enjoying the beauty of nature, taking photos, selfies, bermian, and others. The use of tourist sites as learning resources for pupils is still rare, including the Sawahlunto Science and Technology Center. This is preliminary research aimed at analyzing the need for the development of learning modules based on edupark physics at the science and technology center in Sawahlunto. The type of research used is R&D (research and development) using the Plomp model. This research is carried out only until the stage of preliminary research consisting of student analysis, teacher analysis, and analysis of study material in the science and technology center, Sawahlunto. The data used in this study was taken from the results of the lifting and interviews of two physics teachers and 30 students in the 11th grade at SMAN 13 Padang. Based on the results of this research, it is known that the teaching material of the PjBL-based module associated with edupark has benefits to: motivate students in learning; show the phenomena of physics as a whole; help develop the knowledge and skills of students; and help students master the physical material. In addition, the tourism activities of the science and technology center Sawahlunto can be used as a physics educational park and as an object of the development of teaching materials in the form of the module based on PjBL in photo and video form because of many connections with the physical concept. So it can be concluded that the PjBL-based learning module is suitable teaching material if used as a physics edupark learning medium.

Keywords: Learning Module; Edupark; Project-Based Learning



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## I. INTRODUCTION

Learning is a process of interaction between students, teachers, and learning resources that takes place in a learning environment. Students should be inspired to learn through the educational process in order to comprehend and acquire solid knowledge. [1]. In an era where technology and science are constantly evolving, education plays a key role in preparing the next generation [2]. However, learning can no longer be done the conventional way. Especially in physics lessons that are sometimes considered complicated, a more interesting and interactive approach is needed to build a strong understanding [3]. This situation allows the teacher to be more than just a teacher; he also takes on the role of learning designer. Learning designers, especially physics learning designers, and teachers must be able to ensure that various types of media and learning resources are used appropriately. This is necessary to ensure that students' learning activities [4].

The Ministry of Research, Technology, and Higher Education in Indonesia has spearheaded numerous initiatives to raise educational standards. The conversion of the 2013 curriculum to an autonomous curriculum is one of these initiatives [5]. The independent curriculum emphasizes an active learning approach where students are more involved in the learning process. One way to implement this concept is by involving students in outdoor learning activities. When students are in natural environments or new places, they have the opportunity to directly experience and learn things from direct observation [6]. The implementation of the independent curriculum is slowly progressing. Many educational institutions have implemented this curriculum system either

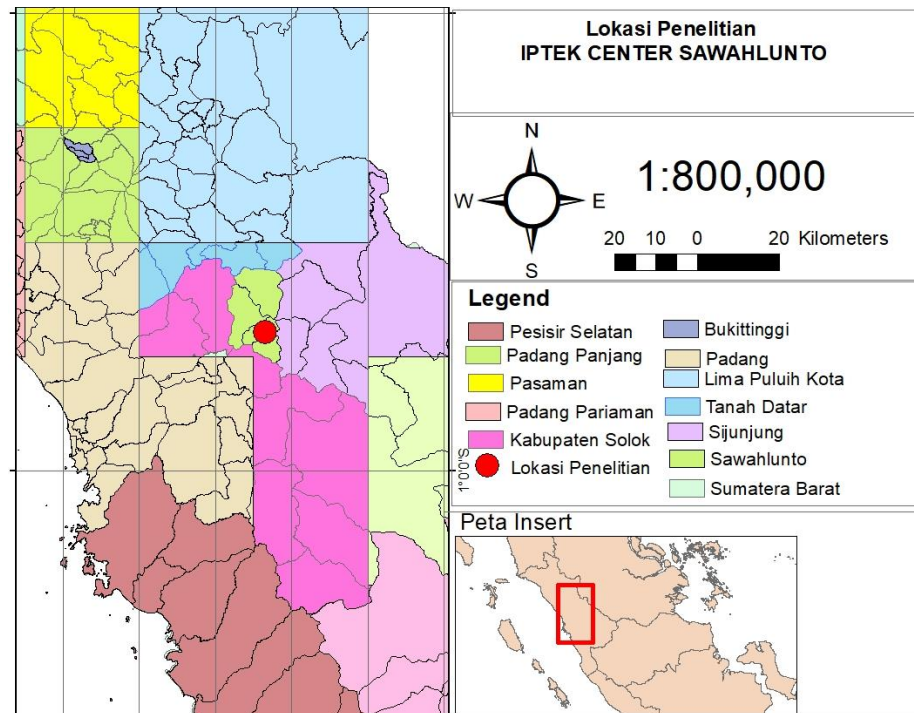
partially or in its entirety [7]. The independent learning program can facilitate attention mapping (Interest) and increase the competence and expertise of students. What is also an advantage of the independent curriculum when compared to previous curricula is that this curriculum also pays attention to the development of local wisdom. In this context, local wisdom is the main factor in learning students will really master the module when using local conditions. According to the Standards Board Curriculum, learning is intended to be interactive, contextual and quality. To fulfill the objectives of the curriculum, innovative learning models are used to increase student motivation and skills [8]. The project-based learning model is one of the learning models that can be used to increase student motivation and skills in accordance with the demands of the Merdeka curriculum.

*Project-Based Learning* (PjBL), or project-based learning, is a student-centered learning model [9], providing a meaningful learning experience [10], conducting an in-depth investigation into a topic [11], and an approach that builds on real learning activities and tasks that provide challenges for students that are related to everyday life [12]. The PjBL model aims to develop the learning experience of students in terms of work motivation, work habits, teamwork, collaborative skills, improving the learning motivation of students, and developing the creativity required in 21st century skills. Project-based learning is a learning model that gives educators the opportunity to manage learning in the classroom by involving projects. The work of the project encompasses complex tasks based on highly challenging questions and problems and guides students to plan, solve problems, make decisions, conduct investigative activities, and give students the opportunity to work independently. The goal is for the student to have independence in completing the tasks he faces. Project-based learning implementation would be better if associated with edupark.

Edupark is an educational park that has the ability to provide learning experiences to students through its various facilities [13]. The edupark concept is in line with local wisdom-based education, which means that local potential and wisdom are used as learning resources [14]. Edupark is expected to provide interactive, entertaining, and outdated education using modern technology [15]. The utilization of edupark through this local wisdom, through which initially visitors only take advantage of the beauty of nature by taking pictures, selfies, and others, will change the view that physics is a boring, difficult, monotonous, rigid subject. Instead, physics learning can occur in a fun context. The utilization of natural and artificial tourism objects as eduparks in the learning process by integrating the rides in the edupark is considered effective in increasing students' interest and motivation in learning physics. Some eduparks that are used as learning resources include Padang Beach Tourism [16], Bayangsani waterfall, South Coast [17], Hot Waterboom Solok Selatan [18], Bukik Chinangkiak [19], Geopark Ngarai Sianok [20], MiFan Waterpark Padang Panjang Attractions [21], Jenjang Seribu and Gunung Merah Putih, Sultan Air [22], Geopark Harau, Lima Puluh Kota Regency [23], and Semerup Hot Springs Kerinci [24].

The diversity of regional potential needs special attention for the government so that children are able to master their own potential and develop it in accordance with global demands. Revolution 4.0 which demands multiple learning resources is in line with the challenges of globalization by utilizing the potential of the region where the area can be used as a learning resource, one of which is the Sawahlunto Science and Technology Center. Iptek Center Sawahlunto is one of the vehicles located within the Goedang Ransoem Museum of Sawahlunto City which was inaugurated in 2008 which coincided with the anniversary of Sawahlunto city. Housed in a former rice warehouse during the Dutch colonial era but now filled with science props. The Science and Technology Center is located at Jalan Abdul Rahman Hakim, Air Dingin Village, Kecamatan Lembah Segar, Sawahlunto City, West Sumatra Province.

The location of the Science and Technology Center can be seen in the map shown in Figure 1.



**Fig 1.** Map of Sawahlunto Regency

Sawahlunto Science and Technology Center is an educational and recreational facility that is able to provide information to students and the community to add to the repertoire of science and technology without boredom. This vehicle is the first science center facility in Sumatra and the fourth in Indonesia, this should be a pride for the people of Sawahlunto. In the Science and Technology Center, we can find a hanoi tower, solar stove, van der graaff generator, lightning, water track, and magic square.

In the research to be conducted, the purpose of the research is to create intended teaching materials that are based offline. Therefore, a preliminary study is essential. It consists of a literature study and a field study. The literature study aims to collect data and determine what learning activities are carried out in schools, while the field study aims to find out the learning conditions in schools and the conditions of tourist attractions that allow it to be used as a good learning resource. This is in line with research conducted by Arizal Fadli, Suharno, and A. A Musadad who stated that field studies involve collecting various information, such as analyzing the needs of teachers and students for teaching materials or learning media to determine field conditions [25]. The purpose of this study is to determine the learning resources used by teachers, obstacles that hinder learning, and learning resources needed by students.

## II. METHOD

The research method used in this research is R&D (research and development), also called the research and development method, with the Plomp development model [26]. Plomp's development model consists of three phases, namely: 1) preliminary research; 2) development/prototyping phase; and 3) assessment phase. (fase penilaian). This research is new to the preliminary investigation phase, which is the phase of collecting and analyzing information, defining problems, and proceeding with project plans.

The data analysis technique used in this research is quantitative and qualitative descriptive statistical analysis. Quantitative descriptive technique by calculating the percentage of the total score of each answer from the respondent, with the formula [27]

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

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

**Table 1.** Category Share Percentage

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

Data collection techniques include interviews, observations, material analysis, and the analysis of learning devices. This needs analysis. Research was conducted in May 2023. The research subjects were taken from 2 physics teachers and 30 students of class XI SMAN 13 Padang, while the object of research was the Science and Technology Center Sawahlunto. At the Plomp development stage, the needs analysis of the physics edupark learning module was developed based on indicator analysis using a data collection questionnaire distributed directly to students as well as interviews conducted with two physics teachers at SMAN 13 Padang, which aim to get a description of the procedures for teachers in carrying out the learning process for students during the learning process. Furthermore, observations were made directly in the field (Science and Technology Center Sawahlunto), which aims to analyze objects related to concepts in physics learning materials.

### III. RESULTS AND DISCUSSION

The research results were obtained from teacher interview questionnaires and student questionnaires. Respondents were 2 physics teachers and 30 students of class XI SMAN 13 Padang. The results of interviews with teachers using some short questions conducted directly at SMAN 13 Padang. Interview answers related to learning and teaching materials used by teachers can be seen in Table 2.

**Table 2.** Teacher Needs Analysis Results

No	Question	Teacher Response
1	Does this school already use the Merdeka curriculum?	50% of teachers answered that they had used the Merdeka curriculum
2	What learning models are often used in class learning?	50% of teachers answered using the Project Based Learning model
3	Is the learning model in accordance with the independent curriculum?	50% of teachers answered accordingly
4	In the learning process, what types of teaching materials do you often use?	Printing and electrical teaching materials in the form of modules and others.
5	Do you think the teaching materials used are enough to help in the learning process?	100% of teachers answered that it was quite helpful in facilitating the delivery of material and classroom management.
6	How is the student handbook in terms of appearance and completeness of information content?	<ul style="list-style-type: none"> <li>• Not yet attractive for all types of student learning styles, the information is not complete.</li> <li>• Appearance needs to be made more attractive</li> <li>• Contextual information needs to be added</li> </ul>
7	In preparing project assignments, are you provided with LKPDs that are in accordance with the PjBL steps?	100% of teachers have equipped students with LKPDs that are in accordance with the PjBL Steps
8	Have you ever linked a tourist attraction with physics learning?	100% of teachers answered that they have not
9	According to you, is it important for teachers to relate the material to be studied with everyday life, for example, such as tourist attractions?	Very important, because if students directly see the original application, students will more easily understand the material.
10	Can students apply physics learning with tourist objects?	This is very rarely done, because it is influenced by the learning process which is only done indoors.
11	Do you think it is necessary to develop physics teaching materials based on tourist objects?	100% of teachers answered strongly agree because it is very useful in the learning process and the application of the material directly in real life.
12	Have you ever developed printed or non-	50% of teachers answered that they had never done

printed teaching materials and other learning support facilities?

it because they were constrained by time and when compiling the teaching materials it was difficult to find references.

Based on the data in Table 2. shows that physics learning at SMAN 13 Padang has implemented the independent curriculum by using the Project Based Learning (PjBL) learning model. The results of interviews with physics subject teachers stated that the learning model was in accordance with the independent curriculum. This is in line with what Indarta et al. said that one of the models often used in the independent curriculum is the PjBL model [28]. Merdeka Curriculum is an educational curriculum implemented in Indonesia and emphasizes project-based learning.

During the learning process teachers use printed and non-printed teaching materials including Apprenticeship worksheet, modules, and package books. The use of teaching materials makes it easier for teachers and students to deliver material and manage the class. However, teaching materials that are used as a guide for students based on the results of interviews are still not attractive in terms of appearance, cannot be used for all types of learning styles, and contextual information content on material that needs to be added [29]. When teachers use good and accurate learning resources, understanding the lesson material becomes easier. Teachers must be creative in facilitating the learning process by using the environment as a learning resource so that the natural wealth can be inherent in the knowledge of students [30].

The use of teaching materials integrated with tourism objects is expected to make physics learning more interesting and can be more contextualized so that students get direct experience that makes learning more meaningful. In addition, based on the results of the interview the subject teacher agreed with the use of teaching materials integrated with tourism objects because it is very useful in the learning process later with the application of material that is directly in his life [31]. In the results of interviews, teachers are still constrained in developing teaching materials, both printed and non-printed teaching materials, because they are constrained in processing time and looking for references for teaching material development needs. Therefore, the author provides a solution in the form of using teaching materials in the form of learning modules integrated with tourism objects, namely at the Sawahlunto Science and Technology Center tourist attraction.

Furthermore, the learning process questionnaire for students consisting of 4 aspects, namely student interest in printed teaching materials, student interest in non-printed teaching materials, application of fiiska learning to the surrounding environment, learning links with eduparks and visits to tourist attractions can be seen in Table 3.

**Table 3.** Analysis of Learning Process Aspects

No	Aspects	Percentage
1	Student interest in utilizing printed teaching materials	78,67
2	Student interest in non-printed teaching materials	44,67
3	Linkage of physics learning with the environment	90
4	Visit to tourist attraction	80,67
5	Application of physics learning with edupark	25

Based on the data in Table 3 above, it is known that the student's interest in using printed material was 78.67%, whereas the non-printed material use aspect achieved a lower percentage of 44.67%. These percentages indicated that students were more interested in using text materials. Printed materials have a good accessibility advantage. Printing materials can be used anywhere and at any time without the need for electronic devices or an internet connection. This makes the text material suitable for use in environments where access to technology may be limited. In printed materials, students tend to focus more on the material they read. Without interruption from electronic devices or online notifications, students can more easily engage in learning and understand concepts in depth [32].

Further on, the aspect of the connection of the facts with the material physics shows a value of 90%, which in the category of very good means that the teacher has applied the learning of physics to the facts that exist around them. Then the aspect of visits to tourist attractions showed a result of 80.67% because of the enthusiasm of students in visiting the tourist sites. This is proven based on an interview conducted with the official guide of Iptek Center. Sawahlunto said this tourist attraction is frequented by tourists, especially students. However, tourists who visit such places are only there to take pictures or to play without realizing that there are many concepts of physics that exist on the travels of such places that can be used as a source of learning physics [33]. Further application of learning with edupark (education garden) showed a score of 25% in the less good

category. The correlation between the physics material studied and the day-to-day activities in the residential environment leads students to gain practical learning experience. Physics learning associated with real phenomena makes physics meaningful, fun, and student-friendly because what they learn is really around them. [34].

#### IV. CONCLUSION

Based on the results of the needs analysis conducted at SMAN 13 Padang, it is known that physics learning has implemented an independent curriculum. During the learning process, the teaching materials used by teachers are still not varied, cannot be used for all learning styles and are not contextualized. This shows that innovation is needed in teaching materials used by teachers to carry out learning, one of which is by carrying out learning integrated with tourism objects, such as learning physics at the Science and Technology Center Sawahlunto. With the existence of teaching materials in the form of learning modules integrated with tourism objects in order to make physics learning more interesting and can be more contextualized so that students get direct experience that makes learning more meaningful.

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