

# The Practicality of Integrated High School Physics Edupark Ebook Sarasah Kajai Waterfall Destinations with a Scientific Approach to the Industrial Revolution 4.0

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## ABSTRACT

*The industrial revolution 4.0 brought many changes. Opportunities are found, but there are millions of challenges to be faced. In facing the industrial revolution 4.0, it is necessary to have the capability and skills of human resources ready. The same is true in education. This type of research is design research with a Plomp development model with three stages: preliminary research, prototype phase, and assessment phase. The data in this study are preliminary analysis data, validation, practicality and effectiveness. The research instrument consisted of a questionnaire, validation sheet, practicality sheet, self-assessment, observation sheet, test questions and performance assessment sheet. Use descriptive statistics to analyze practicality and effectiveness data on attitude and skill competencies. Regarding knowledge competence, the data were analyzed using the N-Gain and the validation data using Aiken's V formula. The preliminary research results showed that it was necessary to develop an edupark ebook integrated with the Sarasah Kajai waterfall destination using a scientific approach. Based on the results of this study, the edupark ebook for the Sarasah Kajai waterfall destination using a scientific approach was very practical criteria.*



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## INTRODUCTION

Education is an important factor in one's life, and one is responsible for delivering the nation's next generation in facing the times (Samsudin, 2019; Widiensyah, 2018). Education is a planned process to develop the full potential of students. The development of the education system continues to be carried out by the government in the process of achieving educational goals. One of the developments in the education system is the improvement of the 2006 curriculum to the 2013 curriculum, which has been implemented in almost all schools. The 2013 curriculum has advantages over the previous curriculum.

The success of the educational process can be seen from the achievement of students' learning competencies. Learning competence includes learning processes and outcomes. The learning process is successful if students are physically, mentally, and socially involved in attitudes, thoughts, attention, and activities in learning activities (Febriana et al., 2018) and (Salam, 2017). In achieving success in this process, students must be prepared to face future

challenges with the ability to solve problems encountered in learning physics. Physics is a branch of natural science that studies the nature and phenomena of nature and all the interactions that occur in it.

One of the factors in achieving the educational process is the use of teaching materials. Teaching materials become learning resources for teachers and students who can help students achieve the expected competencies. The competencies required of students after studying teaching materials are various behaviours shown in their lives according to the learning outcomes they achieve (Akmam et al., 2016). In addition, learning will also be easier if using teaching materials that suit the needs of students (Virijai et al., 2022). Education management in Indonesia encourages education to utilize digital technology to face the industrial revolution 4.0 era. Learners must be prepared to utilize Information and Communication of Technology (ICT) and develop character and readiness for digital-based learning infrastructure.

Teaching materials that can meet the needs of students in the era of the industrial revolution 4.0 are digital books known as ebooks. Ebooks are books that use technology to display information in the form of multimedia text, images, videos, and animations which are made into one information technology-based multimedia, a dynamic appearance so that the information presented is richer than conventional books and used as an alternative in learning (Putrawansyah et al. al., 2016). Ebooks can be read on computers or smartphones.

Learning resources can be used in books, print or electronic media, and natural surroundings. Nature is the main source of learning physics. Learning in nature, especially in tourist spots, can be a solution to understanding physics concepts. Direct learning related to phenomena makes students more enthusiastic about learning and makes it easy to understand. The beauty of nature in tourist spots is usually enjoyed only for taking selfies, even though many physics concepts can be learned in nature. Tourist attractions that are used as learning places are called education parks, which are abbreviated as edupark. Edupark can be applied to all subjects, including learning physics (A. P. Sari, 2021). Several edupark in West Sumatra have been utilized in learning natural sciences, including Mifan Padang Panjang (Hamdi et al., 2019), Sianok Gorge (Emafri & Hamdi, 2019), Janjang Saribu and Bukit Merah Putih Difficult Water (Gusweri & Hamdi, 2019), Harau Lima Puluh Kota (Yulia & Hamdi, 2019), Anai Land (Delvi & Hamdi, 2020), Bukik Chinangkiek (Lestari & Hamdi, 2021), Padang Beach (Elvisa, 2021), Carocok Beach (Rahmadhani & Hamdi, 2020) and Tabek Patah Batusangkar (AP. Sari, 2021).

The scientific approach is the implementation of the 2013 curriculum in the learning process, which is designed so that students actively construct concepts, laws, or principles through the stages of observing (to identify or find problems), formulating problems, submitting or formulating hypotheses, collecting data with various techniques, analyzing data, draw conclusions and communicate the concepts, laws or principles that are "found" (Sufairoh, 2016). Learning conditions with a scientific approach are expected to encourage students to learn from various sources through observation and not just be told by educators. A scientific approach can foster an analytical and critical attitude in students so that students can act effectively and creatively in everyday life (Elwi et al., 2017). The implementation of this scientific approach in learning physics can be developed by direct learning in nature (edupark) using digital-based teaching materials (ebook). Ebook development must be adapted to the scientific approach and learning model recommended by the 2013 curriculum (Putri & Fauzi, 2022).

West Pasaman Regency is an area that has many water tourism destinations, one of which is the Sarasah Kajai waterfall. The position of this tourist area can be easily reached from Simpang Empat, the capital of the West Pasaman district. The natural beauty of the Sarasah Kajai waterfall can provide comfort for visitors, the majority of whom are school-age

teenagers. Unfortunately, this natural beauty has yet to be put to good use in studying physics concepts.

The preliminary study was carried out at SMAN 1 Talamau, SMAN 1 Pasaman, and SMAN 2 Pasaman, located in the tourist area of the Sarasah Kajai waterfall, by administering questionnaires and interviewing six educators and 90 students. The questionnaire was given regarding Graduate Competency Standards (attitudes, knowledge, and skills), the implementation of learning, and the characteristics of students. Regional potential and material studies were carried out in the Sarasah Kajai waterfall area. The Graduate Competence Standard (GCS) analysis on the attitude aspect was obtained in a good category but in a good category on the knowledge and skill aspects (Rika & Hamdi, 2020). Because educators have not presented natural phenomena in learning activities and students cannot observe events in nature directly, students have not been able to associate natural phenomena that occur with physics concepts. Physics is one of the natural sciences; if studying natural sciences is not directly related to nature, physics lessons will be imperfect (Gusweri & Hamdi, 2019). Besides that, using nature, including tourist destinations, is very much needed to develop physics teaching materials (D. P. Sari et al., 2020).

The edupark physics ebook uses a scientific approach to the demands of learning to deal with the industrial revolution 4.0. Students are trained to develop the ability to reason and think analytically, inductively, and deductively by using the concepts and principles of physics to explain various natural events and have the skills to develop science and technology. Based on this, research was carried out to develop an integrated high school physics edupark ebook as a tourist destination for the Sarasah Kajai waterfall using a scientific approach that meets practical criteria: usable, easy to use, attractive, appealing and efficient (cost-effective) learning.

## METHODS

The type of research conducted is research and development (research and development) using the Plomp development model. The product being developed is an edupark physics ebook at the Sarasah Kajai waterfall destination that meets practical criteria. This research begins by analyzing the problems encountered at SMAN 1 Talamau, SMAN 1 Pasaman, and SMAN 2 Pasaman related to the physics learning process, namely the use of teaching materials that have not used a scientific approach combined with regional potential, namely the Sarasah Kajai waterfall destination which can be used as a learning resource. These three schools are high school-level schools located around the Sarasah Kajai waterfall.

The Plomp development model has three phases, namely the preliminary phase, the prototyping phase, and the assessment phase (Akker et al., 2013). The preliminary research phase (preliminary analysis) includes user analysis (students), needs analysis, and context analysis (need and context analysis). The second phase, the prototyping phase (manufacture phase), carried out design, development, and formative evaluation activities (design, development, and formative evaluation). The third phase or phase of the assessment (assessment phase) is an assessment of the product produced to determine practicality and effectiveness. This research is practical research on developing edupark ebook as a continuation of the preliminary research development and prototyping phases.

The research subjects for the high school physics edupark ebook trial at the Sarasah Kajai waterfall destination were class X MIPA students at SMAN 2 Pasaman. Respondents in the study were teachers and students of class X MIPA SMAN 2 Pasaman. Data collection techniques in this study used data collection instruments. Data collection instruments include preliminary analysis instruments and practicality instruments. The scientific approach is used in the primary analysis instrument. This instrument was used to determine

the needs of high school edupark physics ebook users at the Sarasah Kajai waterfall destination. Practical instruments include educator and student response questionnaires to the practicality of the physics edupark ebook. This practicality instrument was analyzed based on the observation instrument using a Likert scale value, namely 4 = strongly agree, 3 = agree, 2 = disagree, and 1 = strongly disagree. The percentage of the final practicality results is grouped into the practicality category, as shown in Table 1.

**Table 1.** Practicality Category

No	Interval (%)	Criteria
1	0-20	Not practical
2	21-40	Less practical
3	41-60	Quite Practical
4	61-80	Practical
5	81-100	Very practical

Source: modified from Riduwan (2009)

## RESULTS AND DISCUSSION

### Results

The practicality test was carried out through the stages of one-to-one evaluation, small group evaluation and field test.

#### 1. One-to-One Evaluation

One-to-one evaluation is carried out by providing student responses. The edupark ebook that has been developed is given to three students with low, medium, and high abilities in class X MIPA 3 SMAN 2 Pasaman without being taught first. The results of the questionnaire on the practicality of student responses at the one-to-one evaluation stage can be seen in Table 2.

**Table 2.** One-to-One Evaluation Results

No	Aspect	Value	Category
1	Can be used	83.33	Very Practical
2	Easy to use	82.14	Very Practical
3	Interesting	87.50	Very Practical
4	Efficient	79.17	Practical
	Average	83.04	Very Practical

Table 2 shows the results of the practicality questionnaire for student responses at the one-to-one evaluation stage, obtaining a practicality score of 83.04 in the very practical category. Of the four aspects assessed, the attractive aspect (appealing) obtained the highest score of 87.50 in the practical category. It shows students are interested in using the edupark ebook to learn physics. Based on the results of direct interviews with the three students, through this edupark ebook, students get to know the potential of Sarasah Kajai waterfall tourist destinations, even only through the ebook. The edupark ebook explains that physics concepts can be better understood if studied directly in nature. The edupark ebook was then revised according to suggestions and comments from students to perfect the edupark ebook for further testing in small group evaluations.

#### 2. Small Group Evaluation

At this stage, the physics edupark ebook was tested on a small group of students totalling nine students in class X MIPA 1 SMAN 2 Pasaman with different levels of ability,

namely three students with high abilities, three students with moderate abilities and three people with low abilities. Practicality test of the physics edupark ebook in small groups using student response practicality sheets. The results of the practical analysis of the physics edupark ebook are shown in Table 3.

**Table 3.** Small Group Evaluation Results

No	Aspect	Value	Category
1	Can be used	86.54	Very Practical
2	Easy to use	87.70	Very Practical
3	Interesting	89.81	Very Practical
4	Efficient	80.56	Very Practical
	Average	86.15	Very Practical

Table 3 shows that the results of the practicality questionnaire analysis of students' responses at the small group test stage obtained a practicality value of 86.15 in the very practical category. This edupark ebook can and is easy to use because students are more comfortable with navigation on their smartphones. Of the four aspects assessed, the attractive aspect (appealing) scored the highest, 89.81. It shows that this edupark ebook invites students' interest in learning physics because it is equipped with sound, pictures, and videos. In addition, ebooks are efficient because they are easy to store, carry, and can be used anytime and anywhere.

### 3. Field Test

The field test (tryout or field test) was carried out on a group of students in a different class from the class that took part in the one-to-one evaluation stage. The number of students who participated in this stage was 35 class X MIPA 2 at SMAN 2 Pasaman. The results of the field test (field test) on the practicality of the edupark physics ebook are as follows:

#### Practicality of Educator's Response

The educator's response questionnaire regarding the practicality of the physics edupark ebook was given to two educators. The results of the practicality test of the educator's response using the educator's response questionnaire are shown in Table 4.

**Table 4.** Educator Response Practicality Test Results

No	Aspect	Value	Category
1	Can be used	85.71	Very Practical
2	Easy to use	82.81	Very Practical
3	Interesting	91.70	Very Practical
4	Efficient	79.17	Practical
	Average	85.50	Very Practical

Table 4 shows the results of the questionnaire analysis of educators' responses to the practicality of the edupark physics ebook, obtaining a practicality score of 85.50 in the very practical category. The material in the edupark ebook is by the 2013 curriculum structure, so this ebook can be used in high school physics learning. Ebooks present material clearly and easily understood by students. The material is further clarified with a video showing the Sarasah Kajai waterfall's beauty; behind that beauty, physics can be understood easily. Ebooks with natural beauty presentations attract students' interest to learn more deeply. Because this edupark ebook is operated by a smartphone, this teaching material is efficient and easy to carry and open anytime and anywhere. The evaluation at the end of each ebook material is online, so students need paper to write answers, and educators no longer need to check student answers individually.

### Practicality of Student Responses

Student response questionnaires related to the practicality of the physics edupark ebook were given to 35 students by providing practicality questionnaires via the Google form link. The results of the practicality test of student responses using the student response questionnaire are shown in Table 5.

**Table 5.** Student Response Practicality Test Results

No	Aspect	Value	Category
1	Can be used	88.96	Very Practical
2	Easy to use	89.49	Very Practical
3	Interesting	89.52	Very Practical
4	Efficient	80.71	Very Practical
	Average	88.62	Very Practical

Table 5 shows the results of the questionnaire analysis of students' responses to the practicality of the edupark physics ebook, obtaining a practicality score of 88.62 with a very practical interpretation. The results of the practicality questionnaire analysis of the responses of educators and students in the categories usable, easy to use, attractive, efficient, and cost-effective are in the very practical category. The instructions and buttons in the edupark ebook can and are easy to use because students are familiar with smartphones. In addition to introducing the potential of the Sarasah Kajai waterfall area and its relation to the physics concept, this edupark ebook is also equipped with sound, pictures, and videos. These three components can facilitate students' learning styles in the auditory, visual, and kinesthetic groups. Even though students' learning styles vary in one class, this edupark ebook can attract students' learning interests.

### Discussion

This study measures four aspects of practicality. The first aspect of practicality is usability. The physics edupark ebook contains material adapted to Core Competence and Basic Competence integrated with the Sarasah Kajai edupark. Learning in tourist attractions allows students to directly observe physics concepts found in nature, making it easier for students to understand physics concepts to achieve learning objectives. The physics edupark ebook can increase students' knowledge in learning physics so that the ebook can train students' independence (Lorantina et al., 2020). The scientific stages in the ebook benefit students by investigating problems, wanting to know, and developing concepts from their learning experiences. It makes learning activities fun, meaningful, and challenging. Activities that exist at this scientific stage can trigger the creation of various learning experiences by involving all the senses, physical and psychological, of students to help develop various potentials of students (Susilana& Ihsan, 2014).

The second aspect is easy to use (easy to use). This edupark ebook is designed using Flipbook PDF Professional software which is easy to apply using a computer, laptop, or smartphone. Ebook users can easily access this ebook by clicking on the ebook link; it will directly enter this ebook. Ebook operation is easy to use in the learning process; it can also be used for those who are not proficient in operating computers (Nisa& Putra, 2020). This mobile-based learning media brings the benefits of the availability of teaching materials that can be accessed at any time, and the visualization of packaged material attracts students' interest (Setiawan, 2017).

The third aspect is attractive (appealing). The appearance in edupark ebook is equipped with pictures, videos, and sounds that attract students' interest, making this ebook a learning resource. Ebooks equipped with pictures and videos can provide explanations to students (Setiawan, 2017). The fourth aspect is efficiency (cost-effectiveness). The physics



edupark ebook can save educators time in the physics learning process. Educators only need to ask students to bring smartphones that are easy to carry anywhere. The edupark ebook has worksheets and evaluations in a google form that students can directly work on. It saves educators time in printing worksheets and evaluation questions. The edupark ebook can save learning time, and learning can be done anywhere and anytime (A. P. Sari, 2021).

## CONCLUSION

The research analysis results on the development of the integrated high school physics ebook Sarasah Kajari waterfall destination with a scientific approach are in the very practical category. Educators and students carry out practicality assessment with four aspects of testing, namely aspects that can be used (usable), easy to use, attractive (appealing), and efficient (cost-effective). It shows that the physics edupark ebook is very practical to use as a physics learning resource in schools to help students achieve learning goals. There are four results from the practical aspect; the physics edupark ebook developed can and is easy to use, has an attractive appearance, and is efficiently used in learning physics.

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