Validity of physics edupark e-book with scientific approach based on tourism destinations of Rumah Gadang

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Abstract. The 21st Century is known for being digitally based and technology that has an influence on learning. The curriculum 2013 seeks to perfect learning based on regional contexts and technology. Lack of integration of learning material with regional contexts and technology utilization makes it difficult for students to understand the concepts of physics. Teachers and students not yet using non-printed in learning material that integrated with the regional context. One of the solutions to this problem is that non-printed in learning material has been created in the form of e-book Edupark physics. The purpose of this study was to produce a physics Edupark e-book with a scientific approach based on tourism destination of Rumah Gadang with valid criteria. The type of this research is educational design research (EDR) using the Plomp development’s model. This stage called prototyping phase I to see the validity of the physics Edupark e-book that was designed. Validation was carried out by three experts, namely physicists, learning or display design experts, and linguists. The data analysis technique used Aiken's V formula. Based on the results of the study, it can be concluded that the physics Edupark e-book with a scientific approach based on tourism destination of Rumah Gadang is very feasible, so that it is declared valid from the components of the material substance, learning design, display and language worthiness.

1. Introduction
The 21st century is known for being digital-based, which has an impact on education. Education today should have a curriculum that adapts to the 21st century, which emphasizes the abilities of students who are assisted by digital-based teaching materials. The 21st century learning seeks to produce students who have insight and can prepare young people to enter the global work reality [1]. One of the things that are the center of attention in learning is preparing an innovative learning system based on digital (technology) [2]. Educators and students need ways and methods in realizing innovative and digital-based learning (technology). Therefore, Indonesia's national education is strived to form innovative and digital-based learning (technology).

The Indonesian government has answered the challenges of the 21st century by revising the curriculum with various improvements from year to year. This can be seen from several revisions in the 2013 Curriculum guidebook. However, these improvements still revolve around learning models and other things that are instructional for example the development of learning models, institutions, and learning approaches. Meanwhile, teaching materials are an important component in supporting the learning process, so it needs to be developed to support the learning process.
This requires the design and preparation of teaching materials by educators by linking teaching materials to regional potential. The existence of teaching materials that contain the potential of this area is known as an education park [3]. Storage activities and discovering learning concepts through the environment are also called Edupark [4]. Edupark (education park) Edupark is a tourist destination that can be used as an educational park to observe the application of learning concepts. Besides Edupark has many physics concepts that can be used as a learning resource.

Indonesia has 34 provinces, one of which is West Sumatra Province which is famous for its beautiful tourism cities and has exotic value. One of the districts in West Sumatra Province, there is South Solok Regency which has a nickname “Nagari Saribu Rumah Gadang”[5]. Rumah Gadang is the name for a traditional Minangkabau traditional house located in South Solok Regency, West Sumatra Province, Indonesia. Rumah Gadang is often referred to as Rumah Bagonjong or Rumah Baanjuang [6]. Rumah Gadang is one of the tourist attractions which is an advantage of the regional potential which is located in the Koto Baru area, Sungai Pagu District. Visitors only take advantage of tourism as a tourist spot for vacationing, taking pictures together, and remembering the cultural values of the Minangkabau. Some of the Rumah Gadang in this area are still original and well preserved. Rumah Gadang has a uniqueness that does not exist in other buildings, namely the Rumah Gadang can maintain its survival for hundreds of years. However, it did not experience any collapse despite earthquakes or hurricanes. Besides, Rumah Gadang has many physics concepts such as inclined planes, the balance of objects, pressure, work, energy, and others [7]. Therefore, the use of Rumah Gadang as a learning resource for Edupark can be used as a study in learning physics.

Physics learning is a branch of natural science that studies the environment to observe, determine, and understand the environment. Physics is a science whose scope of the study is empirical, namely things that can be reached by human observation [8]. Physics learning material becomes more interesting if it integrates with the environment. Learning should provide space for the independence of students and must be carried out in an interactive, interesting, fun, challenging, and motivating students to participate actively [9]. Besides, learning physics is more interesting and fun when it is associated with the environment or tourist destinations.

So far, physics learning has not optimally applied the scientific approach. Physics learning studies mathematical equations and analyzes physical concepts a little. This results in a low understanding of students concepts [10]. Physics learning that takes place in the laboratory is carried out if the school has good facilities and infrastructure. This can be overcome by learning following the demands of the 2013 curriculum in the 21st century (technology) and developing knowledge competencies of students through the Rumah Gadang Edupark. One way to answer the challenges of the 21st century is in the form of non-printed teaching materials in the form of an Edupark physics e-book with a scientific approach based on the Rumah Gadang tourist destination.

E-books are digital books or electronic books that can be accessed via a computer or the like. E-books do not only contain writing, but also animations in the form of images or videos and can be accessed and downloaded for free. E-books are textbooks that are converted into digital format and can be accessed via a computer or laptop [11]. So, e-books are learning media consisting of text, images, or use ones that are useful for conveying messages or information via computers or smartphones so that physics learning is more accessible to students.

The e-book was chosen to facilitate students in improving the resolution of the specified problem. E-books are in great demand, needed and are believed to have benefits for learning activities [12]. E-books that are developed must be able to explore and maximize the potential of students. The e-book developed is interactive based, because it facilitates each student who has different specific abilities. This is because not all students master all abilities, some are more prominent in mathematical abilities, and some are more prominent in their visual and graphic abilities. Besides, e-books can be studied independently by students. Therefore, the design of the Physics Edupark e-book that has been designed must be tested for its measurement level according to the four components including material substance, learning design, appearance, and language. [13].
2. Method
This research type is Educational Design Research (EDR) development research. EDR is the systematic analysis, design, and evaluation of educational interventions [14]. This research development model is the Plomp development model, consisting of three stages, namely a) preliminary research, b) prototype, and c) assessment. The limit of this research is the prototype I stage, which is the design stage and the validity of the physics Edupark e-book with a scientific approach based on the Rumah Gadang tourist destination.

The stages of the prototype phase are as follows: Prototype I determines the level of validity of the designed physics Edupark e-book. The results of the validation were analyzed. If the results of the analysis are not valid, then revisions are made to obtain a valid product. Several things were done during the prototype stage of self-evaluation and expert review. Self-evaluation, namely using a checklist of important questions or design specifications. Expert review, namely group experts who provide services and advice on the product being developed. The expert assessment aims to validate the product including material substance, learning design, display, and language. This activity is carried out online via the WhatsApp application. Experts involved in the prototype validation process are physicists, learning and display design experts, and Indonesian language experts. The aspects that were validated by experts can be seen in Table 1.

| Rated aspect                | Method of collecting data          | Instrument            |
|-----------------------------|-----------------------------------|-----------------------|
| Material Substance Validity | Provide validation to experts      | Validation Sheet      |
| Learning Design Validity    |                                    |                       |
| Display Validity            |                                    |                       |
| Language Validity           |                                    |                       |

The data collection technique was carried out by assessing the physics Edupark e-book based on validation instruments that had been filled in by experts and analyzed. The data analysis technique for the validity value of the Physics Edupark e-book uses the Aiken's V formula with the formula [15]:

\[
V = \frac{\sum s}{[n(c - 1)]} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2.1)
\]

where:
- \( s = r \cdot Io \)
- \( Io = \) the lowest number of validity assessments (in this case = 1)
- \( c = \) the highest number of validity assessments (in this case = 4)
- \( r = \) number given by the validator

Validity criteria is presented by table 2.

| Score | Criteria |
|-------|----------|
| \( \geq 0.6 \) | Valid    |
| \( < 0.6 \)  | Invalid  |

3. Results and Discussion

3.1. Result of Self Evaluation and Expert Review of Edupark Physics E-book
The product being developed is a physics Edupark e-book in the form of non-printed teaching materials made with the help of the Lectora Inspire 17 program, in medium-size and opened on a computer or the like. The physics Edupark e-book consists of a) the initial part which includes, cover e-book, prelim, preface, table of contents, list of figures, list of tables, instructions for use, core competencies, basic competencies, and learning indicators, and the introduction contains information related to Edupark based on the tourist destination of Rumah Gadang Gajah Maaram; b) the content
section includes, the material coverage uses a scientific approach and is presented based on the physics concept in the Rumah Gadang, such as on the roof of the Rumah Gadang there is an inclined plane material presented with a scientific approach, namely observing the video of the roof of the Rumah Gadang, asking according to the video observed, trying out activities about inclined planes, reasoning the results of experiments on inclined planes, and concluding the concept of inclined planes on the roof of the Rumah Gadang. In addition in the content section there are examples of questions and exercises; c) the closing section includes, bibliography, glossary, and author bio.

3.1.1. Self Evaluation. The results of the self-evaluation have several suggestions that need to be revised, such as the type of writing, appearance, and content of the e-book material. In general, it is shown in Table 3.

| Table 3. Self Evaluation Result of Edupark Physics E-book |
| Aspect | Before Revision | After Revision |
|--------|----------------|---------------|
| Font   | The Font in the Edupark Times New Roman e-book | The Font in the Edupark Comic Sans MS e-book |
| Display| The display is still monotonous and not interactive. | The Display is designed interactively. |
| Content of the Material | There is no physics concept yet with the Rumah Gadang Edupark at the door of the Rumah Gadang. | Given an explanation of the concepts of physics related to the door of the Rumah Gadang about the Moment of Force. |
| Problems example | Not in accordance with the Rumah Gadang Edupark | It matches the Rumah Gadang Edupark |

**Expert Review**
Validation is done by providing validation sheets to three lecturers (experts). Validation is said to be complete if the Edupark physics e-book has been revised and the validator has stated that the physics Edupark e-book developed is valid. The results of the validation analysis of the Physics Edupark e-book can be seen in Table 4.

| Table 4. Validation Results of Edupark Physics E-book Products |
| Component Validation | Average Rating | Validator 1 | Validator 2 | Validator 3 | V | Category |
|-----------------------|----------------|-------------|-------------|-------------|---|----------|
| Material Substance    | 0.94           | 0.69        | 1           | 0.88        | Valid |
| Learning Design       | 0.92           | 0.7         | 0.9         | 0.87        | Valid |
| Display               | 0.9            | 0.89        | 0.93        | 0.91        | Valid |
| Language Worthiness   | 0.8            | 0.7         | 0.8         | 0.76        | Valid |
| Average               | 0.85           |             |             |             | Valid |

Table 3 shows that the results of the validation of the physics Edupark e-book product from the four validation components, namely material substance, learning design, appearance, and language (readability) are declared valid.

**Component of Material Substance**
The validation of the e-book on the physics Edupark of the substance of the material obtained an analysis value of 0.88 in the valid category. Several parts of the Edupark physics e-book have been revised in terms of material substance, including:
(a) The notation of symbols on the foundation of the Rumah Gadang is not in accordance with the concept of the pressure of the Rumah Gadang. Where A is the area of the compressive plane by F, in Figure 1.

![Figure 1](image)

(a) Material pressure on the foundation of the Rumah Gadang, before revision; (b) after revision.

(b) There is a sentence that is still there and does not match the symbol with the picture in the material for the moment of the Rumah Gadang door force, in Figure 2.

![Figure 2](image)

(a) Material for the moment of force at the door of the Rumah Gadang, (a) before revision; (b) after revision.

**Component Learning Design**

The validation of the e-book of physics Edupark on the learning design component got an analysis value of 0.87 with a valid category. Some parts of the Edupark physics e-book that were revised in terms of learning design, including:

(a) Example questions refer to the Rumah Gadang Edupark, see Figure 3.

![Figure 3](image)

(a) Examples of questions in the e-book Edupark Physics, (a) before revision; (b) after revision.
(b) The practice problem should not be the same as the example problem.
(c) The material on the foundation of the Rumah Gadang is not in accordance with the concept of physics, especially the material for pressure and Newton's third law.

Component Display
Validation of the e-book of physics Edupark display components got an analysis value of 0.91 in the valid category. Some parts of the Edupark physics e-book that were revised in terms of appearance, including:

(a) The image on the skin of the Edupark e-book is not clear, in Figure 4.

![Figure 4](image)

**Figure 4** The cover of the Physics Edupark e-book, (a) before revision; (b) after revision.

(b) The size of the writing is enlarged because it still looks small. Where before the revision the writing size was 12 and after the revision, the writing size became 14.

Component Language Worthiness
Validation of the e-book of physics Edupark on language components obtained an analysis value of 0.76 in the valid category. Several parts of the Edupark physics e-book have been revised in terms of language, such as those written using passive and standard sentences. Pay more attention to sentence structure and the continuity of the first sentence with the next sentence. 1 correct typing and use of punctuation marks.

3.2. Discussion
The validity of the Edupark physics e-book on the substance of the material includes indicators, first, the correctness of the material that is correct in the presentation of the material. One of the accuracy of the presentation of the object balance material [16]. The presentation material balance of objects has been based on authentic facts, such as presenting information and physics concepts that exist in the framework of the Rumah Gadang building. The Rumah Gadang building is different from other buildings in terms of its foundation in the form of a stone code. However, it can maintain the balance of the Rumah Gadang building for hundreds of years. Besides, Rumah Gadang has earthquake-friendly construction [17]. The object balance material has a coherent procedure to direct students in carrying out learning activities. Besides, the material balance of objects contains the correct physical writing, terms, concepts, and symbols.

The second indicator is in the material substance component, namely depth. The depth of the presentation of the material includes aspects of the foundation, body structure, roof, and the *Rangkiang* of the Rumah Gadang. Analysis of the material in terms of the philosophy of the Rumah Gadang [18]. Besides, the depth of the material is following the scientific approach activities, including making observations of the Rumah Gadang object through videos or pictures. The videos
and images presented can make it easier for students to find information related to aspects of the Rumah Gadang in finding physics concepts. Also, the physics Edupark e-book provides an opportunity to write down questions about the information observed in the physics Edupark e-book. The physics Edupark e-book contains scientific steps by conducting experiments according to the experimental guide and analyzing data or information and presenting the results of the experiment in the physics Edupark e-book. Furthermore, the last scientific activity is to draw conclusions that are carried out orally or in writing while participating in physics learning through the physics Edupark e-book. Therefore, the scientific approach can be used in teaching material to improve the abilities of students through scientific steps. [19].

The third indicator in the component of material substance is present. The current physics Edupark e-book contains material that is under up-to-date and innovative current information, such as the presentation of examples of the application of physics concepts in Rumah Gadang. The validity of the material substance component has been fulfilled because the accuracy of the presentation of the material presented is accurate with the Rumah Gadang tourist destination, following the scientific approach activities, the completeness of the material, and the presentation of the physics Edupark e-book is under the present. The result of the product validity states that the e-book of physics Edupark is valid for the substance components of the material. This is in line with the feasibility of the content in the developed electronic teaching materials that are already at a very good or valid level [20].

The validity of the physics Edupark e-book on the learning design component includes first, the title of the physics Edupark e-book is under the content of the material and does not exceed twenty-two words. Second, the core competencies of the physics Edupark e-book are following the SMA/MA syllabus. Third, basic competencies and learning indicators are following the material on the aspects of the foundation, body structure, roof, and the structure of the Rumah Gadang. Fourth, the learning objectives in the physics Edupark e-book are appropriate and show the benefits that students get in learning. Fifth, the material presented in the physics Edupark e-book is under the objectives, the preparation of scientific steps, students' understanding, physics concepts, procedures, and the Rumah Gadang Edupark object. Sixth, sample questions are following the objectives and Edupark of Rumah Gadang. Seventh, the exercises in the physics Edupark e-book are following the abilities of students. Therefore, the learning design for a teaching material is carried out proportionally and presents the predetermined teaching material components [21].

The next learning design indicator is that the preparation of the physics Edupark e-book is following the attention to the physics Edupark e-book component. References in the physics Edupark e-book are clear and the media are clear, for example, documented pictures or videos that are privately owned or not. The results of the product validity state that the physics Edupark e-book is valid for the learning design component because the design that has been designed is appropriate and proportional. This is in line with the Edupark interactive multimedia learning design developed that is valid because it is following the established assessment aspects [22].

The validity of the physics Edupark e-book on display components includes First, basic navigation that works well, hyperlinks, feedback, dialog boxes that can be written directly, adjustable lighting, and storage of scores from practice and tests. Second, the letters in the Edupark physics e-book can be read, do not use too many font combinations, the font size is more proportional, and the color of the letters contrasts with the background. Third, the media in the physics Edupark e-book is appropriate, such as videos or images, which are following the object and function properly. Color composition, layout, supporting software using Lectora Inspire 17. Fourth, the colors in the Edupark physics e-book have good color composition and good color appearance. Fifth, the Edupark physics e-book layout displays a video or image according to the Rumah Gadang object. Video or images do not slow down the Edupark physics e-book slideshow and its proportional layout. Sixth, the supporting software in the physics Edupark e-book uses Lectora Inspire 17 and can make the physics Edupark e-book interactive. Therefore, the appearance of teaching material is very important because it can influence students to experience interesting and meaningful learning [23].
The validity of the display eligibility component is valid and appropriate because it has a proportional appearance. Students like the appearance of the Edupark physics e-book because it is made with easy-to-understand button navigation, an attractive appearance, and media that provide information in explaining learning concepts. Besides, educators like the interactive appearance of the Edupark physics e-book. The results of the validity of the physics Edupark e-book stated that the physics Edupark e-book was valid on the display component. This is following what Shalikhah did that teaching materials through the Lectora Inspire software, an educator can easily develop interactive teaching materials and students feel the benefits of learning using teaching materials made through the Lectora Inspire software [24]. Besides, the material presented can be adapted to the environment, situations, and conditions of students.

The validity of the physics Edupark e-book on the language eligibility component includes first, the accuracy of using language rules in the physics Edupark e-book using correct Indonesian language rules, not having a double relationship, referring to PUEBI, and using punctuation marks that are according to standard Indonesian grammar rules. Second, the use of terms, symbols, or icons in Edupark physics e-books has been reported correct and consistent scientific names or symbols in Edupark physics e-books. Third, the coherence and integration of the flow of direction are correct, such as sentence conclusions between sentences in paragraphs and the material presented has reflected the relevance of the content. Fourth, conformity to the level of development has used language following the level of development of students and the language used is following the intellectual level of students. The results of the product validity on the feasibility component of the statement language that the e-book physics Edupark is valid. This is related to the results of previous research that the development of teaching materials has language compatibility with the level of students [25].

Physics Edupark e-book has been declared valid because it has made improvements with expert lecturers related to the material substance components, learning design, appearance, and language. Besides, the physics Edupark e-book has met the criteria of an e-book that is suitable for use by the Education Unit, including the beginning, the content, and the end.

4. Conclusion

Based on the Prototype I stage carried out is an expert review of the design of the physics Edupark e-book that has been designed through the Lectora Inspire 17 software, it is stated that the physics Edupark e-book with a scientific approach based on the Rumah Gadang tourist destination has valid criteria. Therefore, the Edupark physics e-book with a scientific approach based on the Rumah Gadang tourist destination is suitable for use as non-printed teaching material in the 21st-century digital-based era.

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