Design and manufacture of teaching edupark physics Mifan water park Padang Panjang, Indonesia with discovery learning model

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Abstract. The background of the design and manufacture of the textbook is a follow-up to the preliminary research. Based on the preliminary research revealed: first, there are many facts, principles, concepts on the tourist attraction of Mifan Water Park Padang Panjang, Indonesia. Second, the need for the development of fluid Edupark learning devices in Mifan Padang Panjang Waterpark. The purpose of this research was to produce learning devices in the form of teaching books by making the tourist attraction of Padang Panjang Mifan Water Park as Educational Park (Edupark). This Textbook is designed based on the 2013 curriculum by containing discovery learning syntax. The type of the research is using the Plomp development model at the stage of development and prototyping phase. The data collection using questionnaire techniques. Validation was carried out on instrument sheets and teaching books by three material validates, language, and constructs from the lecturers. The data analysis technique used is a Likert scale and the value of validity using Aiken's V formula. This research produces textbooks that have valid categories. The conclusion of the results of this research is that the textbooks have been made are suitable for use in physics learning activities as a source of learning physics in high school.

1. Introduction
Now the world has entered the era of the industrial revolution 4.0. This era has led to new technologies that have led to extraordinary changes in all disciplines, economics and industry including the education sector. Schools especially the high school level must prepare a new literacy to deal with the disruption of the technology. High school graduates are not enough to master old literacy (reading, writing and mathematics), but need new literacy such as data literacy, technology literacy and human literacy. Data literacy is related to the ability to read, analyze and make conclusions of thinking based on data and information (big data) obtained. Technology literacy is related to the ability to understand how machines work. Application of technology and technology-based work of products to get maximum results. Human literacy is linked to communication, collaboration, critical thinking, creative and innovative skills.

In line with this era, Indonesia has experienced a change in curriculum in the curriculum that states where the learning process in an educational unit is held interactively, inspiratively, fun, challenging, motivates students to participate actively, and provides sufficient space for initiative, creativity, and independence in accordance with talents, interests, and physical and psychological development of
students [1]. The process of learning in the curriculum in 2013 developed two learning processes, namely immediate and learning process indirectly. A direct learning process in which student develop knowledge, thinking abilities and psychomotor through direct interaction with learning resources. In direct learning the students learn to observe, ask questions, gather information, associate or analyze, and communicate what they find in the analysis activities. One form of direct learning is learning that carried the region travel like Attractions Minang Fantasy (MiFan) Water Park Padang Panjang, Indonesia[2], Geopark Canyon Sianok, Indonesia [3], Janjang Siribu and mountain Merah Putih, Sulit Air, Indonesia [4] Geopark Harau, Lima Puluh Kota District, Indonesia[5] Semurup Hot, Kerinci [6] and school parks [7], While indirect learning is a process that occurs during learning, but is not designed in specific activities relating to the development of values and attitudes [8]. One of the learning innovations that can in teachers in the realization of the curriculum and change the old to the new literacy literacy is innovation in teaching materials.

Teaching material is an important part in the implementation of education in schools. Teaching materials are all forms of materials used to assist educators in carrying out the learning process in class [9]. These materials, learners delivered for teaching purposes [10]. The use of teaching materials will be easier to carry out learning and learners would be more helpful and easier to learn. Teaching materials are essentially the contents of subjects or fields of study given to learners in accordance with curriculum have used. A teaching material at least includes, among others: a) study instructions (student or teacher's instructions), b) competencies to be achieved, c) supporting information, d) exercises, e) work instructions, can be in the form of worksheets (LK), f) evaluation [11]. Teaching materials can be made in various forms according to the needs and characteristics of the teaching material to be presented and of course the teaching material used refers to the 2013 curriculum.

One form of teaching material is a textbook which is a tool that allows helping students to learn a competency or basic competencies so that they are able to master all competencies as a whole. The material in the textbook is the realization of the material listed in the curriculum [12]. Textbooks are very useful to use in learning, while the benefits of textbooks include: 1) Can accelerate the discussion of study material. 2) Students can learn the study material to be taught earlier. 3) In the textbook can also be inserted exercise - exercise should be done contextual problem-oriented students. 4) Questions can be made based on textbooks so that the assessment is more fair according to students' abilities. 5) With the textbooks, the theories conveyed by the teacher that cannot be understood in class, students can relearn from the textbooks. 6) With the textbook, if there is a task that must be done at home students already have one of the references to do it [13].

The preliminary research on development models Plomp in SMA Negeri 2 Padang Panjang against the competency standards on aspects of attitudes, knowledge and skills are in the category enough. Likewise with the results of the analysis of the average rating is in the sufficient category. While the students' analysis revealed that physics is a monotonous subject and is still considered difficult. The students have varied learning styles. The learning process tends to be student-centered. Analysis was also carried out on attractions in Padang Panjang namely the attraction (MiFan) of the Padang Panjang Water Park. This was done in view of the growing attractions both natural attractions or artificial every area. The tour object is crowds on holidays, but the use of these attractions is just playing, selfies or just entertainment activities. From the results of observations, on these attractions a lot of facts, concepts or principles that can be used in learning physics [2]. At the high school level the government has provided learning textbooks as a source of learning, but the use of textbooks in schools has not been maximized. From field observations, it is known that only one or two students carry the textbooks and even educators rarely use the book in learning.

Moving on from these problems, a textbook is needed. One form teaching is textbook physics edupark MiFan Water Park Padang Panjang. This textbook makes a vehicle on the attraction (MiFan) Water Park as an edupark or educational park. In the edupark MiFan Water Park is expected that students can explore as much information and do activities related to the basic competencies that must be mastered. This textbook contains guidelines for users so that the use of the MiFan Water Park as an edupark in implementing direct learning can be maximized. This textbook is designed with the
The syntax of discovery learning. The students organize their own knowledge because teaching materials are not presented in the final form. Learning with the discovery learning approach, has the characteristics of stimulation, problem statements, data collection, data processing, verification, and generalization [14]. By applying the syntax of discovery learning to this textbook, it is hoped that students can actively participate in learning, practice critical thinking and provoke creativity, but remain in a fun context so that physics is no longer considered a monotonous subject that deals with formulas and numbers.

The purpose of this study was to produce the design and manufacture of MiFan Water Park Padang Panjang edupark textbooks, Indonesia with a decent discovery learning model in terms of language, content and media (presentation and graphics). It is hoped that the development of this textbook can realize expectations in the face of this era of disruption and realize the learning process that is demanded in the standard education process that is characterized by the 2013 curriculum while fostering the interest of relevant parties to continue to innovate in making textbooks that are in accordance with needs.

2. Research methods
This research uses the development method (research and development) with the Plomp development model in the development and prototyping phase. This stage is a continuation of the preliminary research stage. This research method is used to produce certain products and test the validity of these products. The scope of the research is the development of textbook physics edupark MiFan Water Park Padang Panjang. This textbook is used as a learning resource for all levels are discussing the basic competencies in accordance with edupark MiFan Water Park. The development of this textbook includes designing and making textbooks and validating the textbooks so that the textbooks are feasible to be developed. In the process of product testing, researchers ask for help validate (judgment) by a team of experts who are language lecturers, physics lecturers and mathematics lecturers at the Padang State University.

The validation process is carried out on two things, first the validation of the instrument and second the product validation. Instrument validation is done to see the feasibility of the instrument made, while product validation is carried out to test the feasibility of the language, content or material, as well as the media. In order to obtain a feasible value for the textbook developed, product validation was carried out by the expert test team. Product validation can be done by experts or experienced experts to assess product strengths or weaknesses [19]. Data collection at the instrument validation and product validation stages is carried out by providing questionnaires with a checklist and a qualitative suggestion column.

Validation completed with stuffing checklist later on if the s when Likert with the criteria of assessment; Strongly agree (4), agree (3), disagree (2), and strongly disagree (1). The total score of each validator for all indicators is summarized and its validity value by using the formula Aiken’s[15]:

\[ V = \frac{\sum s}{n(c-1)} \times 100 \% \]  

Where:
- \( s \) = \( r - lo \)
- \( lo \) = Lowest validity score (in this case = 1)
- \( c \) = Highest validity score (in this case = 4)
- \( r \) = The number given by the validator

Categories of validity for textbook development can be seen in Table 1.

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

Table 1. Validity Categories
3. Research results

Textbooks edupark *Fisika MiFan* Water Park is designed as a learning resource for high school Physics consists of three subject matter, namely Enterprise and Energy, Fluid Static and Dynamic Fluid as in Table 2.

| Material                | Fill in the Material                                                                 |
|-------------------------|--------------------------------------------------------------------------------------|
| Energy and Business     | • Energy and Business Concepts                                                       |
|                         | • Power concept                                                                      |
|                         | • Application of the Law of Conservation of Mechanical Energy in Daily Life          |
| Static Fluid            | • Main Law of Hydrostatic                                                            |
|                         | • Hydrostatic Pressure                                                               |
|                         | • Pascal's Law                                                                      |
|                         | • Archimedes' Law                                                                   |
|                         | • Meniscus                                                                          |
|                         | • Symptoms of Capillarity                                                            |
|                         | • Static Fluid Application in everyday life                                         |
| Dynamic fluid           | • Dynamic Fluid Concept                                                              |
|                         | • Streamline & Continuity Principle                                                  |
|                         | • The Bernoulli Principle                                                            |
|                         | • Application of the Continuity & Bernoulli Principle                                 |

The design of this textbook includes: cover, introduction, description of Physics subjects according to the 2013 Curriculum, instructions for the use of textbooks, at a glance about the attractions of MiFan Water Park Padang Panjang, list of images, list of tables, table of contents, content or contents of subject matter, examples questions, exercises, worksheets, evaluation, answer key, bibliography, glossary, index, appendices and author's biographical data. The appendix contains attitude assessment, knowledge assessment and skills assessment. The contents of the subject matter begins with the cover in each chapter, followed by exposing Core Competence, Competency and Competency Achievement Indicators and learning objectives. The contents of this material are also equipped with a mind map.

Edupark physics textbook products MiFan Water Park are made using A4-sized paper (210 × 297 mm). The textbook cover is accompanied by pictures of MiFan attractions and Padang Panjang city boundary gates with Tanah Datar District as shown in Figure 1.
The Suggestions given by the validator on the cover did not experience significant improvements, only changing the location of the textbook users who were originally located in the upper left then changed their location under the title of the textbook.

Products textbook edupark Physics Mifan Water Park Padang Panjang has been designed, conducted a self-evaluation of the textbooks that. Textbooks are reviewed again if there are errors in typing, writing, spelling, material, illustrations or drawings by asking colleagues for responses. The next step is validation of the Mifan Water Park Physics course in Padang Panjang.

Validation is done on two things: validation of the validation assessment instrument and validation of the textbook product. Validation is done by a team of experts from the three lecturers who serves as a validator bahasa, validator isi and media validator. The feasibility assessment of the expert test team regarding the validation instruments made is shown in Table 3.

| No. | Components of Validation Instrument Rating | Value |
|-----|------------------------------------------|-------|
| 1.  | Language                                 | 0.94  |
| 2.  | Fill in                                  | 0.94  |
| 3.  | Media                                    | 0.73  |
|     | Average                                  | 0.87  |

Table 3 shows the validation instrument has a value of 0.87. Analysis of the assessment of the validity of the instrument using a Likert scale and validity test using the Aiken's V formula where for a large value equal to 0.6 the validity is declared valid thus the results of the validation assessment of the validation instrument are declared valid so that the instrument which is used to validate the product is feasible to use.

The results of the product validation provided by the expert test team related to the feasibility of language, content / media, media (the feasibility of presentation and the feasibility of graphics), can be seen in Table 4 below:
Table 4. Summary of Textbook Validation Results from All Validators

| No. | Validation Component          | Value |
|-----|------------------------------|-------|
| 1.  | Language                     | 0.85  |
| 2.  | Contents/materials physics  | 0.95  |
| 3.  | Media (graphic)              | 0.69  |
| 4.  | Media (Presentation)         | 0.71  |
|     | Average                      | .83   |

Based on Table 4 it is found that the average value of the assessment of the feasibility of textbooks is 0.83, including the valid category so that textbooks can be continued at the next stage of the Plomp development model stage.

There is criticism and input from the expert team related to textbooks, in order to produce textbooks even better. The revision does not affect the content of the textbook as a whole, the revision is more directed to sharpening the analysis of the material, improvement of writing, the appearance of images, and coloring in the textbooks. must be relevant to the material presented, (2) there are still some concepts that have not been revealed when discussing an activity that is used as a source of learning in attractions; (3) to be sharper in analyzing the activities carried out in the edupark lab; (4) improvement in the correct use of spelling (PUEBI); (6) change the design of the presentation of mind maps in terms of coloring and division of the realm of knowledge, attitudes and skills into three parts; (7) the use of too much writing color; (8) placement of the use of textbooks is placed under the title of the textbook.

The identification and analysis of the results of the product design validation provided by the expert team on the checklist and the suggestion column as well as the improvement input will be used as the basis for researchers in making improvements to the deficiencies that still exist in the textbook product. The textbook design revision has been carried out, as follows: (1) adjust the image supporter with the material presented; (2) improvement in time to review an object or activity in the utilization of the object if the object or the event there is more than one existing concepts at the same time ; (3) have carried out deeper material analysis when discussing an object or activity carried out in the edupark lab; (4) make improvements regarding the accuracy of the use of spelling (PUEBI); (6) revising the design of the presentation of mind maps in terms of coloring and division of the realm of knowledge, attitudes and skills into three parts that were originally integral to partial; (7) reduce the color of the writing ; (8) revise the placement of the use of the textbook under the title of the textbook.

4. Discussion
The product developed starts from a preliminary analysis conducted at the preliminary research stage which is one of the stages in the Plomp development model. Analysis has been carried out on graduate competency standards, student analysis, assessment analysis, analysis of the learning process and analysis of the attractions of MiFan Water Park Padang Panjang [2]. Based on the analysis, it is necessary to develop an edupark textbook of MiFan Water Park Padang Panjang Physics with the discovery learning syntax. The preliminary study of this textbook design departs from an analysis conducted on the MiFan Water Park vehicle. Physics concepts whatever is in MiFan Water Park and adjusted with Competency Inti (KI), the suitability of Basic Competencies (KD), learning objectives, subject matter, and so forth contained in the syllabus of physics [1] [16].

The design and manufacture of teaching and learning have gone through stages which are adapted to the development model of plomp at the prototyping phase. The material contained in the textbook is material disclosed from the MiFan Water Park attraction in Padang Panjang, Indonesia but still refers to the Information Commission and KD contained in the physics learning syllabus [16]. This textbook provides guidance to users in utilizing a wet game vehicle as an edupark (educational park), therefore
this textbook is designed using the discovery learning syntax. The design starts with a self-evaluation which is useful for checking the completeness of the components contained in the developed textbook.

This textbook is designed in the form of non-textbook activities whose material is read, filed and memorized, therefore this textbook contains 1 learning steps which include: (1) providing stimulus at the beginning of the discussion, (2) preparing students for activities which have been guided to the lab Edupark and identify as many-many questions that relate to the basic competencies that are being studied. Identification is continued by proposing a hypothesis, (3) students collect data and information related to the identification stated, (4) processing the data (5) verifying, and (6) providing conclusions.

After the textbook is finished, the design is printed into a draft to be validated by a team of experts. Before the expert team fills in the validation instrument, the validation instrument is carried out first. Validated instruments include language validation instruments, material validation instruments and media validation instruments. The three instruments are filled by different validators. Product eligibility if the validation result is ≥ 0.6 [15]. The results of the validation of the three validates each obtained a value of 0.94 for language instrument assessment validation, 0.94 for material instrument valuation validation and 0.73 for media instrument valuation validation. The average score of the three instruments scored 0.87 with a valid category. Based on the results of the validation done by the expert team stated that, the textbooks that have been made have a decent category in terms of language, content, and media (presentation and graphics) by obtaining a value of 0.83 and are allowed to enter the next stages of the Plomp model development series.

The design and manufacture of edupark textbooks for Physics MiFan Water Park Based on Discovery Learning has been adjusted to the rules of writing a textbook [17] [18] are:

4.1. Beginning Section
This initial section contains
- Cover
- Page title
- Preface
- Study Instructions
- Competencies to be Achieved
- Supporting Information
- Table of Contents
- Image List
- List of Tables

4.2. Content section
- Chapter 1
- Chapter 2
- Chapter 3

4.3. Closing Section
- Bibliography
- Glossary
- Index
- Rating
- About the Author

The stages of making teaching books have been modified and based on the results of expert (lecturer) tests, showing that the teaching books that have been made are valid. Viewed in terms of the concept of subject matter, the presentation of material, language, and graphics have already met the requirements in the preparation of teaching materials determined by the Ministry of Education and Culture [19]. The validation of the textbook results from the expert team became prototype 1 of the existing prototype phase in the Plomp development model which is ready to be continued for the next phase.
5. Conclusion
The conclusion of this study is the design of edupark physics textbook MiFan Water Park Padang Panjang consisting of cover, preface, description of Physics subjects according to Curriculum 2013, instructions for the use of textbooks, at a glance about the attractions of MiFan Water Park Padang Panjang, list of images, list of tables, table of contents, the content or the content of subject matter, sample questions, exercises, worksheets, evaluation, answer key, bibliography, glossary, index, appendix and author biography. The validation of the textbook results from the expert team became prototype 1 of the prototype phase in the Plomp development model which is ready to be continued for the next phase.

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