Validity of integrated science textbook with the theme of meteor fall using immersed model based on IDEAL problem solving

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Abstract. The validity of textbooks is important to gain recognition of the textbook's suitability to the needs. The aim of this research is to produce a valid integrated science textbook with the theme of meteor fall using immersed model based on IDEAL problem solving for junior high school. The method used in this research is descriptive statistics. The textbook's validity was assessed by three experts and three practitioners using a validation sheet. The validity textbook was analysed by using Aiken's V formula. The analysis of data shows the results of the expert validity with an average of 0.90 and validation of practitioners with an average of 0.82. These findings indicate that integrated science textbook meteor fall theme using immersed model based on IDEAL problem solving by experts and practitioners are in a valid category. Overall, this integrated science textbook with the theme of meteor fall using immersed model based on IDEAL problem solving declared eligible to be used in learning.

1. Introduction

Textbooks are the main learning source to ensure the achievement of curriculum objectives [1]. Textbooks are used as a source of information for learners in learning activities. Textbooks are considered as one of the most important reference and learning resources for learners in learning activities [2]. The textbook functions are reference material by learners, evaluation materials, educational aids in implementing the curriculum and one of the determinants of teaching methods or techniques that educators will use [3].

Integrated science textbook is structured with an integrated model by integrating natural phenomena as a theme in textbooks. Learning done by linking natural phenomena that occur around the learner will make learning process more meaningful [4]. The theme of the textbook is the theme of the meteor fall. The event of the meteor fall is one of the natural events that threaten the territory of Indonesia. As an astrophysicist from the National Aeronautics and Space Administration (LAPAN), said that in many parts of the world have almost the same probability of catastrophic meteor fall.

Textbooks developed with an integrated science immersed model, theme selection on an integrated immersed model is a theme based on the interest of learners. The immersed model is an integrated learning model that combines the needs of learners based on the interests of learners so that they are
able to learn something from their own interests and experiences. The immersed model is designed to help learners refine and integrate experiences and knowledge related to the field of use [5].

Textbooks consist of several parts of the cover of the book, the front of the book, text book and the back of the book. The book's cover is a cover designed in such a way as to make it look attractive and describe the book's content. The front of the book is the introduction, the table of contents, and the preface. In the introduction, there is a general overview, guidance of the use of textbooks, graduate competence standard (SKL) and core competencies (KI) of science learning which refers to Pemendikbud Number 21 of 2016. In the text section of the book consists of subtheme title, material identity, mind map, material description, student activity sheet, summary and evaluation. The material presented in the textbook in accordance with the demands of KI, basic competencies (KD), and indicators that have been formulated, the discussion of relevant questions with the problems contained in the text book [6]. Student Activity Sheets in textbooks are designed with IDEAL problem solving syntax consisting of identify problem, define the problem, explore the solution, act on strategy, look back and evaluate the effect [7]. The IDEAL problem solving model has several advantages to train learners’ creativity with activities that provide opportunities for learners to use their thinking power, develop ideas, and propose a solution to the problem so that learners have problem solving skills [8]. While in the back of the textbook there is a glossary and bibliography.

Textbook validation is done to obtain the recognition of textbook suitability with requirement. Validity refers to the appropriateness, significance, truth, and usefulness of instruments or procedures that measure what should be measured[9]. Assessment of validation is done by experts, didacticians, practitioners, etc. and who were not involved in the elaboration of the textbook[10]. A valid textbook is a textbook that fulfill the feasibility of content, construct, language, and graphics[11].

Researches on validity textbook were done previously. Gilavand et al (2016) has conducted content analysis on science textbooks for junior high school, this research shows that some of the textbook components have not received attention or only a few[12]. Khine and Liu (2017) conducted a descriptive analysis of the graphic representations of science textbooks, the results suggested in the preparation of textbooks of graphical representations use them to have the domain knowledge conveyed in various topic areas [13]. Kraishan (2015) reviewed the feasibility of textbooks based on teacher perspectives, the results show that in the preparation of textbooks should be based on the potential and the environment around the learner [14].

Research on textbook validation is still limited to textbook content analysis, textbook graphic representations and textbook validity by practitioners. This textbook validation study is still needed to see the validity of textbooks based on expert opinions and practitioners and to see the worth of textbooks on aspects of content, construct, language, and graphics. In addition, the integrated science textbook with the theme of meteor fall has never been tested before. The purpose of this research is to determine the validity of integrated science textbook with the theme of meteor fall using immersed model based on IDEAL problem solving. The research question formulation is how is the validity of integrated science textbook with the theme of meteor fall using immersed model based on IDEAL problem solving based on expert and practitioner opinion in terms of content, construct, language, and graphics?

2. Research method
The method used in this research is descriptive statistics. The data collection instrument uses validation sheets that have been validated by the expert. The validation sheet has four scales with criteria that strongly agree (4), agree (3), disagree (2), and strongly disagree (1). Validation involves three experts and three practitioners to validate the textbook. The total score of each validator for all indicators are summed, and then analyzed using a formula Aiken's V.

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

with \( s = r - lo \) [15].
Notes: $lo$ is lowest category, $ce$ is highest category, $r$ is value provided by the validator, and $n$ is total number of raters.

Categories validity textbook can be seen in Table 1.

| Table 1. Categories validity textbook. |
|--------------------------------------|
| Value | Category |
| ≥ 0.6 | Valid |
| < 0.6 | Invalid |

3. Results and discussion

Textbook validity is observed on aspects of the content, construct, language, and graphics. Results of validation textbook on aspect content by experts and practitioners can be seen in Table 2.

| Table 2. Results of validation textbook on aspect content. |
|----------------------------------------------------------|
| Aspects observed                                      | Value by expert | Criteria | Value by practitioner | Criteria |
| Textbook presents descriptions of materials and activities that support awareness raising learners of the greatness of Allah SWT. | 1.00 | Valid | 0.89 | Valid |
| The textbook presents a description of the material that can support the development of students' scientific attitudes. | 0.83 | Valid | 0.78 | Valid |
| The material presented in the textbook is in accordance with the demands of KD. | 0.83 | Valid | 0.89 | Valid |
| The material presented in the textbook is in accordance with the demands of the formulated indicators. | 0.83 | Valid | 0.89 | Valid |
| The material in the textbook is presented in accordance with the breadth of knowledge. | 0.83 | Valid | 0.89 | Valid |
| The material in the textbook is presented according to the depth of knowledge. | 0.67 | Valid | 0.78 | Valid |
| Facts in the presentation of the problem presented in accordance with the topic on the material. | 1.00 | Valid | 0.78 | Valid |
| Material presented in accordance with the truth of science. | 1.00 | Valid | 0.89 | Valid |
| The concept is presented correctly (accurately). | 1.00 | Valid | 0.89 | Valid |
| Procedure is presented in a coherent manner. | 1.00 | Valid | 0.78 | Valid |
| Description of the material presented up to date. | 0.83 | Valid | 0.78 | Valid |
| Meteor fall material on textbook adds to the reader's knowledge. | 1.00 | Valid | 0.78 | Valid |
| Activity of the learners presented includes the skills contained in the KD formulated from the KI 4. | 1.00 | Valid | 0.67 | Valid |
| Learning step on the activity sheet of learners in accordance with the learning model IDEAL problem solving. | 0.83 | Valid | 0.78 | Valid |
| Average | 0.90 | Valid | 0.82 | Valid |

Based on experts and practitioners judgment on the content aspect obtained valid textbooks. The results of the validity of the content aspects by experts and practitioners obtained the value of 0.90 and 0.82 with a valid category. These results indicate that the textbook has been demonstrated conformity with the contents of the 2013 curriculum which includes the dimensions of spiritual attitudes, social, knowledge and skills[11]. Each chapter in the textbook is already serving a description of materials and activities that support the improvement of the spiritual and social attitudes of learners. In addition,
the material in the textbook complies with the basic competency demands and the formulated indicators, material coverage, material accuracy and material material contextuality. The material of the fall of the meteor as the theme of the textbook increase the reader's knowledge of the natural phenomena surrounding.

The activities of learners served in the textbook is already reflect the skill substances in the basic competencies and core competencies 4 and complies with the stages of 5M (observe, ask, try, reason and communicate). The learning step on the activity sheet of the learners is in accordance with IDEAL problem solving learning model. Learning activities on the activity sheet of students using the IDEAL problem solving phase lead learners on problem solving that is displayed in accordance with the phenomena that have been adapted to the topic material. Results of validation textbook on aspect construct by experts and practitioners can be seen in Table 3.

Table 3. Results of validation textbook on aspect construct.

| Aspects observed                                               | Value by expert | Criteria | Value by practitioner | Criteria |
|---------------------------------------------------------------|-----------------|----------|------------------------|----------|
| Presentation of the concept starts from simple to complex.     | 0.83            | Valid    | 0.89                   | Valid    |
| The material in the book is clearly illustrated on the concept map.| 0.67            | Valid    | 0.89                   | Valid    |
| Numbering in the order table corresponds to what is written in the text. | 1.00            | Valid    | 0.89                   | Valid    |
| The serial numbering corresponds to what is written in the text. | 1.00            | Valid    | 0.89                   | Valid    |
| Picture refers to the reference source.                       | 1.00            | Valid    | 0.78                   | Valid    |
| Examples of problems in each chapter help to reinforce the understanding or principle that exists in the material | 1.00            | Valid    | 0.67                   | Valid    |
| At the end of the chapter there is a summary or summary presented briefly. | 1.00            | Valid    | 0.67                   | Valid    |
| Problem evaluation in accordance with the learning objective.  | 0.83            | Valid    | 0.89                   | Valid    |
| References to textbooks are listed on the referral list.      | 1.00            | Valid    | 0.78                   | Valid    |
| Presentation of materials encourages the active participation of learners in learning activities. | 0.83            | Valid    | 0.89                   | Valid    |
| Presentation uses examples from the learner's environment.     | 0.83            | Valid    | 0.89                   | Valid    |
| Average                                                       | 0.91            | Valid    | 0.85                   | Valid    |

The results of the validation textbooks on the construct aspects by expert and practitioners obtained value of 0.91 and 0.85 with a valid category. This shows that the presentation of textbooks has met the criteria of presentation technique, supporting material presentation, and presentation of learning [11]. Textbook presentation techniques should pay attention to systematic consistency and presentation demands. The systematic presentation of the material becomes an important aspect in the preparation of textbooks, because the composition of the material coherent allows learners to understand the material as a whole [16]. The material presentation of the textbook is supported by concept maps, sample questions, summaries, evaluations and references that make it easier for learners in understanding the material of science. Results of validation textbook on aspect language by experts and practitioners can be seen in Table 4.

The result of validation of textbook on aspect language based on expert obtained value 0.94 and practitioner obtained 0.81 with valid category. This shows the language used in textbooks developed in accordance with the developmental level of learners, communicative, in accordance with the correct Indonesian language, coherence and consistent in the use of symbols [11]. The use of language is an important factor to be concerned. The use of language is very influential on the benefits of teaching materials, although textbook content is meticulous, use a consistent format and packaged with
interesting if the language used is not understood by the students then textbooks will not be meaningful [17]. Results of validation textbook on aspect graphics by experts and practitioners can be seen in Table 5.

Table 4. Results of validation textbook on aspect language.

| Aspects observed                                                                 | Value by expert | Criteria | Value by practitioner | Criteria |
|----------------------------------------------------------------------------------|-----------------|----------|-----------------------|----------|
| Language used in accordance with the level of development of learners.           | 0.89            | Valid    | 0.89                  | Valid    |
| Language used is easy to understand.                                             | 0.78            | Valid    | 0.78                  | Valid    |
| Language used is not ambiguous.                                                  | 1.00            | Valid    | 0.89                  | Valid    |
| Information presented in the textbook is clear.                                  | 1.00            | Valid    | 0.89                  | Valid    |
| Language used is correct according to Indonesian grammar rules.                  | 1.00            | Valid    | 0.89                  | Valid    |
| Spellings used in textbooks in accordance with the General Spellings of Indonesian (EBI) guidelines. | 1.00            | Valid    | 0.89                  | Valid    |
| Message delivery between sections reflects the content of the content.           | 0.89            | Valid    | 0.67                  | Valid    |
| Message or material presented in the chapter reflects the unity of the theme.     | 0.89            | Valid    | 0.67                  | Valid    |
| Consistent in using symbols.                                                     | 1.00            | Valid    | 0.78                  | Valid    |
| Average                                                                          | 0.94            | Valid    | 0.81                  | Valid    |

Table 5. Results of validation textbook on aspect graphics.

| Aspects observed                                                                 | Value by expert | Criteria | Value by practitioner | Criteria |
|----------------------------------------------------------------------------------|-----------------|----------|-----------------------|----------|
| Size of textbooks conforms to ISO standards.                                     | 0.67            | Valid    | 0.89                  | Valid    |
| Size of the book corresponds to the content of the book.                         | 0.83            | Valid    | 0.89                  | Valid    |
| The cover design shows a unified whole.                                          | 0.67            | Valid    | 0.89                  | Valid    |
| Cover book can give description about the contents of the book.                  | 0.83            | Valid    | 0.78                  | Valid    |
| Proportional book layout.                                                        | 1.00            | Valid    | 0.78                  | Valid    |
| The font used is evident.                                                        | 1.00            | Valid    | 0.67                  | Valid    |
| The picture illustration on the book exactly matches the material.                | 1.00            | Valid    | 0.67                  | Valid    |
| Blend of colors in the book interesting.                                         | 0.83            | Valid    | 0.89                  | Valid    |
| The textbook display design draws the reader.                                     | 0.67            | Valid    | 0.89                  | Valid    |
| Average                                                                          | 0.83            | Valid    | 0.81                  | Valid    |

The result of textbook validation aspect of graffiti on the basis of expert skill obtained value 0.83 and the practitioner obtained the value of 0.81 with valid category. This indicates that the proportional book size, cover design and content design already reflect the contents of the book. Textbooks using clear fonts, layout and proportional book layout, color blend and book cover attracts the readers.
Design of textbook display such as cover image and color combination greatly affect reading interest of learners[18].

4. Conclusion
These findings indicate that the junior high school integrated textbook theme meteors fall using immersed model based on IDEAL problem solving by experts and practitioners are in a valid category. The validation of science textbook science textbook with the theme of meteor fall using immersed model based on IDEAL problem solving can already be declared feasible on aspects content, presentation, linguistic and graphics.

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