Development of Pop-Up Book Integrated with Quranic Verses Learning Media on Temperature and Changes in Matter

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Abstract: Learning media is needed by an educator as an intermediary to deliver material to minimize failure in the learning process. The use of pop-up books or books that have three-dimensional elements when the book is opened is deemed suitable to be used as a learning medium for temperature material and its changes. This study aims to determine the development, feasibility, and response of students to the learning media pop-up book integrated Al-Qur’an verses on the material of temperature and its changes. Subjects in this study were seventh-grade students in Junior High School 3, Al-Huda Junior High School and Junior High School Amal Bakti. Data collection instruments in the form of expert questionnaires of material, media, religion, the response of educators and students to find out the attractiveness of the media pop-up book. The results of the study showed that the development of learning media pop-up book integrated with Al-Qur’an verses had an average percentage of media experts 80% in the decent category, material experts 85.6% in the very decent category, and religious experts 88% in very decent categories. The response of educators from three schools gets an average percentage of 82.35% in very interesting categories. The students' responses to the small group trials from three schools got an average percentage of 81.2% in the very interesting category and the response of students in the field trials received an average percentage of 84.8% in the very interesting category, so it can be concluded that the pop-up book is very worth to use.

1. Introduction
Education or studying is an obligation for every human being. Allah SWT instructs people to always study with diligence, tenacious and always ask people who are known as in the Qur'an the letter Az-Zumar verse 9, reads:

Meaning: Are you a lucky polytheist or are you the person who worships at night by prostrating and standing, while he is afraid of (the punishment) of the Hereafter and hopes for the mercy of his Lord? Say: "Are there those who know those who do not know?" Indeed, the one who can accept the lesson.

Education is said to be quality if education can answer various kinds of challenges and problems faced in the present and future, one of which is the availability of complete learning media. Learning media is needed as an intermediary in delivering material in the learning process in order to minimize failure in the delivery of material when it takes place so that the learning process is more meaningful.[1]. Learning media must be developed continuously in accordance with the developmental needs of students' times. [2].

The learning process is said to be meaningful (good) when it contains interactive, challenging, fun, motivating aspects. While the learning media used today still use a lot of textbooks and LKS (student worksheets) which only have two-dimensional writing and pictures that cannot move, it makes students tend to be bored, passive, and less interactive. [3]. In addition, learning media is a learning resource that can improve understanding, experience, and quality of learning. [4]. Therefore we need interesting learning media and make students not feel bored, easy to understand the material, and without reducing the contents of the material.

One interesting and fun learning media is learning media in the form of pop-up books. A pop-up book is a book that has a three-dimensional element when the book is opened. [5]. Besides attracting pop-up books, it also contains elements of entertainment through illustrated images that can be shaped,
moved, and have an effect on the paper page when opened. [6]. Pop-up books also have an upright part of the picture and when opened can form beautiful and extraordinary objects. [7].

There are several types of techniques pop-up book, namely transformations, namely a form of display consisting of pieces pop-up vertically arranged, volvelles, namely a form of appearance that uses a circle element in its creation, peepshow, which is a display composed of a series of The stack of stacked paper is stacked together, creating an inward and perspective illusion, pull-tabs, namely a sliding paper tab or a drawn shape that is pushed to show the movement of a new image, Carousel, this technique is supported by straps, ribbons or buttons that when it is opened and folded back in the form of a complex object, box, or cylinder and box and cylinder is the movement of a cube or tube that moves up from the center of the page when the page is opened. [8]. Pop-up books are not only used for children but are now also used for illustrations in a wider range such as medicine, geometry, and astronomy. [9]. Pop up books besides giving unique visualizations can also stimulate students in learning, develop capacity, and facilitate students in understanding the material. [10].

Pop-up books are almost the same as origami where both of these arts use paper folding techniques, so pop-up books present visualizations with shapes created by folding and so on, therefore, pop-up books are considered suitable when used in science learning (Natural Sciences).

We can learn natural science in everyday life wherever and whenever. [11]. Science (physics) is a science developed based on the idea that the Qur'an is the source of all sources of knowledge, meaning that the proof of the truth of physics not only focuses on scientific truths but also seeks a more complete source of truth. So between science and religion is seen and functioned in a balanced way to find the truth. There are a lot of spiritual values that can be applied in physics learning, because the concepts and materials of physics are closely related to the verses of the Qur'an, one of which is in studying the temperature material and its changes. [12].

Based on the results of the pre-study by distributing questionnaires and interviews to science educators at State Junior High School 3 JatiAgung, Al-Huda Junior High School JatiAgung, and Amal Bakti Junior High School Jati Agung, the results of the Natural Science (Physics) learning process that took place so far have been going well. Many students are still afraid of science subjects (Physics). Media used by educators are still simple such as textbooks, student worksheets (LKS), Liquid Crystal Display (LCD), school environments, powerpoints and occasionally using animation and video, and have never used learning media pop-up. The teaching materials used are still ordinary teaching materials that have not been integrated with the verses of the Qur'an so that the delivery of Islamic values derived from the verses of the Qur'an is done occasionally during the teaching and learning process takes place.

While based on the results of pre-research by distributing questionnaires and interviews to educator participants in Junior High School 3, Al-Huda junior high school and junior high school Amal Bakti. There are still many students who think science lessons, especially physics are difficult subjects because many formulas who must be memorized and difficult to understand the material, even though most students already have a handbook.

Therefore, researchers feel the need to develop learning media pop-up book integrated Al-Qur' verses on temperature material and its changes.

2. Research Methods

Types of research used to research and development with ADDIE models (analysis, design, development, implementation, and evaluation). [13].

![Figure 1 Research Methods](image-url)
But researchers limit the research carried out until the fourth stage, namely implementation, due to the limitations of both material and time. Data collection techniques used were observation, interviews, and questionnaires. Data were collected using expert validation sheets, educator response sheets, student response sheets and data analysis using a Likert scale using a score of 1 to 5. Then the total assessment is used using the following equation:

\[ P = \frac{\sum X}{SMI} \times 100\% \]

Description:
P: The Number of percentages to be achieved in each alternative answer.
\( \sum X \): Many numbers choose alternative answers.
SMI: There are many ideal values in the alternative answers [14].

Then to find out the feasibility and attractiveness of the pop-up book, the results of the questionnaire are searched for the average using the formula.

\[ x = \frac{\sum xi}{n} \]

Description:
\( Score_{\text{max}} \): Maximum
\( \sum Score \): Score Total
X: Final
\( x_i \): Total Number of Respondents
n: Total of Respondents

To replace the assessment criteria for learning media validator can be seen in Table 1 [15].

**Table 1**

| Level of achievement (%) | Criteria      |
|--------------------------|---------------|
| 81%-100%                 | Very Feasible |
| 61%- 80%                | Feasible      |
| 41%- 60%                | Quite Feasible|
| 21%-40%                 | Less Feasible |
| 0 – 20%                 | Not Feasible  |

Table 1 is the eligibility criteria for percentage analysis used as a reference to see the percentage of product trials. If the score is obtained at 0-20% intervals, the pop-up book is said to be inappropriate, if the score is obtained at intervals of 21% -40%, then the pop-up book is said to be less feasible, if the score is obtained at intervals of 41%-60% said quite feasible, if a score of 61%-80% is said to be feasible, and if a score of 81%-100% is obtained, then the pop-up book is said to be very feasible.

To convert the criteria score for the assessment of students' responses to the learning media can be seen in Table 2 [16].

**Table 2**

| Category                  | Score | Percentage |
|---------------------------|-------|------------|
| Not Interesting           | 1     | 0%-20%     |
| Less Interesting          | 2     | 21%-40%    |
| Quite Interesting         | 3     | 41%-60%    |
| Interesting               | 4     | 61%-80%    |
| Very Interesting          | 5     | 81%-100%   |

3. Results and Discussion

Validation of learning media pop-up book integrated Al-Qur' verses on temperature material and changes were made by 5 experts, consisting of 2 media experts, 2 material experts, and 1 religious expert. Based on the assessment of media experts to study media pop-up book integrated verses of the Qur'an on the material temperature and amendments contained three aspects, namely the size of the pop-up
book, the cover design of the pop-up book, and content design pop-ups book. In the assessment of material experts, there are 4 aspects, namely aspects of content feasibility, aspects of language, aspects of presentation feasibility, and contextual aspects. In the assessment of religious experts, there are 2 aspects, namely aspects of content quality and aspects of media display. In this study, two validations were carried out, namely the validation of the initial product and the product after the revision.

a. Media Expert Validation
Tabulation of validation results by media experts on the initial product and product after revision is presented in graphical form as follows.

![Figure 2 Media Expert Tabulation Diagram](image)

Figure 2 is the validation results of two media experts on pop-up book products. The initial product validation stage was obtained 80% for the size aspect pop-up book with a decent category, 75.75% for the cover aspect pop-up book with a decent category, and 78.15% for the design aspect of the contents pop-up book with a decent category. After the product was revised and re-validated it was obtained 80% for the size aspect pop-up book with a decent category, 82.80% for the cover design aspect pop-up book with the very decent category, and 78.76% for the content design aspect pop-up book with a decent category. Based on the results of stage 1 and stage II validation, the average score of 79.4% was categorized as feasible.

b. Expert Validation Material
Tabulation of validation results by material experts in the initial product and product after revision is presented in graphical form as follows.

![Figure 3 Expert Tabulation Diagram Material](image)

Figure 3 is the result of validation by two material experts on the pop-up book product. The initial product validation stage was obtained 67.50% for the aspect of feasibility of the content with a decent category, 72.20% for the aspect of language with a decent category, and 62.50% for the feasibility aspect of presentation with a decent category. After the product was revised and re-validated it was obtained 80% for the aspect of feasibility of the content with a decent category, 85% for the aspect of language with a decent category, and 60% for aspects of contextual assessment with sufficient
categories worth it. After the product was revised and re-validated, 87.50% was obtained for the feasibility aspect of the content with a very feasible category, 90% for the language aspect with a very feasible category, and 80% for the aspect of feasibility of presentation with a decent category, and 85% for the aspect of contextual assessment with a very feasible category. Based on the results of stage 1 and phase II validation, the average score of 75.6% was categorized as feasible.

c. Validation of Religious Expert
Tabulations of validation results by religious experts are presented in graphical form as follows.

![Result of Religion Experts](image)

**Figure 4** Validation Results of Religion Experts.

Figure 4 is the result of validation by religious experts on pop-up book product s. In the aspect of quality content obtained a score of 96% in the category of very feasible, on the aspect of media display obtained a score of 80% in the feasible category, so obtained an average of two aspects of 88% with a very feasible category.

d. Teacher Response
In the trial of 3 physics teachers at SMP Negeri 3, Al-Huda Jatiagung Middle School, and Amal Bakti Jati Agung Junior High School, there were 3 aspects of assessment, namely aspects of content quality, aspects of media display, aspects of technical quality. The tabulation of the results of the science educator response is presented in the following diagram.

![Teacher Response in Three Shools](image)

**Figure 5** Teacher Response Tabulation Diagram

Figure 5 is the result of the responses of the three teachers for the content quality aspect to have 87.62% interest in the category of very interesting, the aspect of media display gets the percentage of interest 81.67 % with a very interesting category, and technical quality aspects get an attractive percentage of 77.78% with an interesting category. Three aspects of assessment can be obtained the average results of the percentage of 82.35% with a very interesting category.

e. Student Response
The results of trials on students in three schools can be seen in the following diagram 5.
Based on figure 6, the results of the small group trials in three schools conducted by 10 students were found in the aspect of interest obtained 83% in a very interesting category, the material aspect was obtained 82% with very interesting categories, and the ease of use aspect was obtained by 78% with an attractive category, so that the average of the three aspects was 81% with a very interesting category.

Based on graph 7, the results of field trials in three schools conducted by 30 students were found to be 89% interested in the aspect of very interesting categories, the material aspect obtained 87.6% with very interesting categories, and the ease of use aspects obtained 84.8% with very interesting categories, so that the average of the three aspects was 87.14% with a very interesting category.

The first purpose of this product development is to find out how to develop learning media. Pop-up Book integrated Al-Qur'an verses on temperature material and its changes.

The second objective of this product development is to find out the feasibility of learning media pop-up book integrated Al Qur'an verses in the temperature material and its changes. Based on the results of research conducted by researchers by conducting validation by experts and product testing stages, it can be concluded that learning media pop-up book integrated with Al-Qur’an verses can be used in a very feasible category.

The third objective of this research is to find out the attractiveness of the learning media to pop-up book integrates the Quranic verses on the material of temperature and its changes. The pop-up book is compiled based on competency standards, basic competencies, and achievement indicators. The pop-up book is also equipped with material that is integrated with the verses of Al-Qur’an examples of questions, exercises, and bibliography that students can use more interestingly.

The pop-up book developed has been validated by 5 experts including 2 material experts and 2 media experts, as well as 1 religious expert. After going through the validation phase, the material experts, media experts, and language experts were then tried out to educators, small group trial students, and field trials to find out the attractiveness of the pop-up book.

Based on the results of the media expert validation, obtained product improvement advice. These suggestions are used as a reference for improvement in the initial product. The initial product improvements are as follows:

1. add the serial number of readings in each display pop-up. In the initial product there is no serial number for the reading pop-up, so based on the suggestions given, the serial number of the reading is added pop-up.
Based on the results of the material expert validation, obtained product improvement advice. These suggestions are used as a reference for improvement in the initial product. The initial product improvements are as follows:

1. The theory is made based on indicators. In the initial product, the product is not made based on indicators, then based on the advice given the Theory is made based on indicators.
2. The image is adjusted to the title. In the initial product, the product image is not in accordance with the title and then based on the advice given a customized image title.
3. Each box pop-up is titled. The initial product for each pop-up is not given a title, so based on the suggestion, the title is given.
4. Add an interactive dialogue section to students. In the initial product there is no interactive dialogue to the students, so according to the advice given plus the interactive dialogue section to students.
5. Each indicator is made into questions. In the initial product the problem is not in accordance with the indicator, then according to the suggestion given by the sample is made in each indicator.
6. Fix the order of material. In the initial product, the material has not been sequential, then according to the advice given material arranged in sequence.
7. Fix material writing in accordance with the correct and correct language rules (EYD). In the initial product the writing of the material is not in accordance with the rules of the language (EYD), then according to the advice given the writing of material in accordance with the correct and correct language rules (EYD).
8. Add a picture of the taste senses, not a temperature gauge. In the initial product there is no picture, so according to the advice given plus a picture of the taste, the tool is not a temperature gauge.

Based on the results of validation by religious experts, obtained recommendations for product improvement. These suggestions are used as a reference for improvement in the initial product. As for the improvement of the initial product as follows:

1. Add an interpretation of Al Mishbah written by M Quraish Shihab. In the initial product there is no Al Mishbah interpretation written by M Quraish Shihab, then according to the advice given added the interpretation of Al Mishbah written by M Quraish Shihab.

Following are some product images after revision:

| Figure 8 | Figure 9 | Figure 10 |
|----------|----------|-----------|
| Cover pop-up book | Core Competencies, Basic Competencies and table of content | Types of Thermometers |

| Figure 11 | Figure 12 | Figure 13 |
|-----------|-----------|-----------|
| Temperature scale definition | Temperature and Expansion Scale | Solids Expansion |
The pop-up book developed by researchers has advantages and disadvantages. The advantages of the pop-up book are as follows:
1. Pop-up book is made using thick paper so it is not easily damaged (torn).
2. Each pop-up book page contains interesting pop-up images, making students more active, enthusiastic and enthusiastic about learning.
3. The material presented in the pop-up book integrates the verses of the Qur'an.
4. Pop-up books can be used independently or in groups.

The weaknesses of the pop-up book developed by researchers are as follows:
1. Pop-up book is not easy to use in school that is not Islamic oriented.
2. The material in the module that is being developed is limited to 1 subject.
3. The process of making a pop-up book is complicated and requires a large fee.

4. Conclusions and Recommendations

Conclusion
1. This research product in the form of learning media pop-up book integrates Al-Qur'an verses on temperature material and its changes. This research and development step uses the ADDIE (model analysis, design, development, implementation, and evaluation).
2. The feasibility of learning media pop-up book integrates Al-Qur'an verses on temperature material and changes according to experts are said to be very feasible. The results of validation by media experts get an average percentage score of 80.55%, material experts get an average percentage score of 85.6%, and religious experts get an average percentage score of 88%.
3. Teachers and students in SMP Negeri 3 JatiAgung, South Lampung Regency, Al-Huda Jati Agung Junior High School, South Lampung Regency, and Amal Bakti JatiAgung Middle School, South Lampung Regency, gave a positive response to the learning media pop-up book integrated with verses of the Qur'an on the temperature material. The results of the percentage of the average score of the teacher is 82.35% in a very interesting category, the results of the small group trial get an average percentage score of 81.2% with a very interesting category, and the results of field trials get an average percentage score of 87.14% with a very interesting category.

Recommendations
1. For schools, the learning media should be a pop-up book used in the learning process to increase students' creativity.
2. For educators, the development of learning media pop-up book can be developed in a sustainable manner with different material and during the learning process using media pop-up book, educators must better control the class.
3. For the next researcher, after the pop-up book is tested the validity of the validator should be that the learning media is pop-up book tested for its effectiveness in improving student learning outcomes.
References

[1] R. Febrianti 2016 Pengembangan Media Pembelajaran Berbasis Augmented Reality Pada Kompetensi Dasar Memahami Rangkaian Multiplexer, Recorder Flip-Flop dan Counter Kelas X SMK Negeri 2 Surabaya J. IT-Edu 1
[2] S. Mariani, Wardono & E. D. Kusumawardani 2014 The Effectiveness of Learning by PBL Assisted Mathematics to pop up book Against The Spatial Ability in Grade VIII on Geometry Subject Matter Int. J. Educ. Res. 2
[3] S. P. Haryanto 2017 Pengertian Minat Belajar Pengertian Minat Belajar AJARAN 2012-2013
[4] F. Ahmad, Salahuddin, Trimurti & K. Khasanah 2017 The Development of Pop-up Book Media To Improve 4th Grade Students' Learning Outcomes of Civic Education Int. Conf. Theory &Practice
[5] F. Ukhtinasari, Mosik & Sugiyono 2017 Pop-up Book Sebagai Media Pembelajaran Fisika Materi Alat-alat Optik Untuk Siswa ekolah Menengah Atas Unnes Phys. Educ. J. 6
[6] A. D. Devi & S. Maisarah 2017 Pengembangan Media Pembelajaran Buku Pop-up Wayang Tokoh Pandhawa Pada Mata Pelajaran Bahasa Jawa Kelas V SD Jurnal PGSD Indones. 3
[7] S. P. Ramadhani, W. Amelia & R. Mahardika 2018 Development of Indonesian Cultural Environment Education Books to Increase Reading Students Elementary School (Interactive Pop-up Book Betawi Culture) Int. J. Innov. Sci. Res. Technonology. 3. 7
[8] A. Siregar and E. Rahmah 2016 Model Pop up Book Keluarga Untuk Mempercepat Kemampuan Membaca Anak kelas Rendah Sekolah Dasar
[9] C. R. R. Jr, S. N. Le, J. Yu & K.-L. Low 2014 Multi-style Paper Pop-up Designs from 3D Models EUROGRAPHICS 33 2
[10] S. A. Sari 2017 The Development of Pop-up Book on the Role of Buffer in the Living Body Eur. J. Soc. Sci. Educ. Res. 10
[11] E. P. Permata & Y. E. P. Sari Development of Pop Up Book Media Material Distinguishing Characteristics of Healthy and Unfit Environments Class III Students Elementary School Int. J. Elem. Educ. 2 1
[12] Winarti 2015 Pengembangan Perangkat Pembelajaran Fisika Bermuatan Integrasi Islam-Sains Untuk Menanamkan Nilai-nilai Spiritual Siswa Madrasah Aliyah JPFK 1
[13] Sugiyono 2016 Metode Penelitian dan Pengembangan (Research and Development/R&D) (Bandung: Alfabet)
[14] I. M. Tegeh, I. N. Jampel & K. Pudjawon Model Penelitian Pengembangan (Yogyakarta: Graha Ilmu)
[15] A. Asyhari & H. Silvia 2016 Pengembangan Media Pembelajaran Berupa Buletin Dalam Bentuk Buku Saku Untuk Pembelajaran IPA Terpadu J. Ilm. Pendidik. Fis. Al-BiruNi 5
[16] Lindawati 2016 Pengembangan Bahan Ajar IPS Berbasis Kecakapan Hidup (Life Skill) Untuk Siswa Kelas V SD J. Penelit. Univ. Jambi Seri Hum. 18