

## Pocketbook Development Based on Inquiry (PBBI) on Thermodynamics of Class XI IPA

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### ABSTRACT

*This study was conducted aimed at 1) describing the design of inquiry-based pocketbook learning media (PBBI) on thermodynamic physics material, and 2) describing the feasibility of inquiry-based pocketbook (PBBI) as a thermodynamic material physics learning medium. This research was conducted in class XI science at MA Mambaul Ulum Megaluh Jombang and class XI science at MA Ghozaliyah Sumbermulyo Jombang. The research model used is the ADDIE development model {(analysis), design, development, implementation, and evaluation}. The results of the study resulted in inquiry-based pocketbook learning media products (PBBI). in the form of a pocketbook packaged in a compact disk (CD) with a display using Flip PDF Professional 2.4.8, The feasibility of the product is seen through product validation tests and product readability tests Product validation tests are obtained from media experts and material experts who are prone to an average score an average of 3.20 with proper classification. While the readability test was obtained from the teacher's response questionnaire and the response of students who got an average score of 3.19 with proper classification. So it can be concluded that the inquiry-based pocketbook (PBBI) is suitable to be used as a physics learning medium.*

**Keywords:** *Pocketbook, Inquiry, Thermodynamics.*

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### INTRODUCTION

The 2013 curriculum is the curriculum used in current learning. The 2013 curriculum emphasizes student-centered learning (student-centered learning), with the hope that learning will be inspiring, fun, and motivate students to be more active in learning in class.

Based on the results of observations in one of the MA in Jombang, it shows that the 2013 curriculum can not be used optimally in the learning process due to several factors such as physics material that is too difficult to understand, practicum activities are rarely carried out, students' reading activity is lacking, the media is less varied and the learning methods used. still teacher-centered (teacher center learning) so that the opportunity for students to find their own concepts taught and students' scientific literacy skills are still low.

One of these problems was immediately overcome by using the right learning media. Learning media that are considered to be able to make students more active are (inquiry-based pocketbooks). A pocketbook is a small book that contains information, can be stored in a pocket, and is easy to carry everywhere (Mustari & Sari, 2017). (Winarto et al., 2018) stated that pocketbooks can be used in learning as a medium of learning that is quite feasible and of very good quality to improve students' understanding abilities.

This pocketbook is collaborated using an inquiry-based approach. According to (Nurwahid, 2017) an inquiry-based approach is a learning activity that invites students to play an active role in seeking and finding solutions to existing problems. An inquiry-based approach is related to active activities and skills in the search for knowledge or understanding (Suyono et al., 2016).

PBBI media is a pocketbook that serves to convey information about physics subjects that are used as supporting media. The advantages of PBBI are: 1) attractive background, 2) contains animations and videos, 3) can be opened anytime and anywhere with a Personal Computer (PC), 4) there are crossword

puzzles. The pocketbook in collaboration with the inquiry approach is expected to be used in the learning process.

Although there are already pocketbook learning media with an inquiry approach for some physics materials, there are no inquiry-based pocketbook learning media (PBBI) that discusses the physics of thermodynamic material. Thus, the development of inquiry-based pocketbook learning media (PBBI) with studies including 1) describing the design of inquiry-based pocketbook learning media (PBBI) for physics on thermodynamics, and 2) describing the feasibility of inquiry-based pocketbooks (PBBI) as physics learning media. thermodynamic material.

## METHOD

This study uses a research and development (R&D) type that uses the ADDIE development model { Analysis, Design, Development, Implementation, and Evaluation }. This research was carried out at MA Jombang in the even semester, 2019/2020 academic year. This research was conducted in March 2020. The subjects of this study were class XI IPA MA Mambaul ulum Megaluh Jombang with 17 students and class XI IPA MA Ghozaliyah Sumbermulyo Jombang with 18 students.

The flow of this research is: 1) doing observations in class. 2) planning an Inquiry-Based Pocket Book (PBBI) using Adobe Illustrator CC 18.0.0, Microsoft Word, and Flip PDF Professional 2.4.8. 3) develop the Inquiry-Based Pocket Book (PBBI) learning media by validating the product to 3 media experts and 3 material experts. 4) perform product application tests. 5) conduct an evaluation obtained from the results of the student response questionnaire.

The instrument used in the development of the Inquiry-Based Pocket Book learning media is to make observations first and then provide a questionnaire that has been made by the researcher. There are 4 types of questionnaires used, namely for media expert validation, material expert validation, teacher response questionnaires, and student response questionnaires. The data from this research are the results of responses and input by media experts, material experts, teacher response questionnaires, and student response questionnaires. To test this Inquiry-Based Pocket Book (PBBI) product, it is in the form of a questionnaire that has its criteria. Criteria for assessing product feasibility and readability data in Table 1.

Result value = (sum of values)/(many components)

**Table 1.** Expert Validation Results

Assessment Score	Vulnerable	Clasification Score
4	3,26 – 4,00	So Worth It
3	2,51 – 3,25	Worthy
2	1,76 – 2,50	Not Worth It
1	1,01 – 1,75	Not Feasible

(Mustari & Sari, 2017)

## RESULT AND DISCUSSION

### Result

The development of the Inquiry-Based Pocket Book (PBBI) begins with the following stages:

- The analysis phase is the material analysis by selecting relevant material, analyzing student characteristics by knowing academic ability through report cards and economic background of class XI science students at MA Mambaul Ulum Jombang and MA Ghozaliayah Jombang.
- The second stage is the planning stage (design) by making a written storyline, determining the theme, color, and size of the PBBI which is designed using Adobe Illustrator CC 18.0.0, Microsoft Word, and Flip PDF Professional 2.4.8. And make assessment instruments. The complete design can be seen in Figure 1, Figure 2, Figure 3, and Figure 4.



Figure 1. Cover



Figure 2. Core Competence

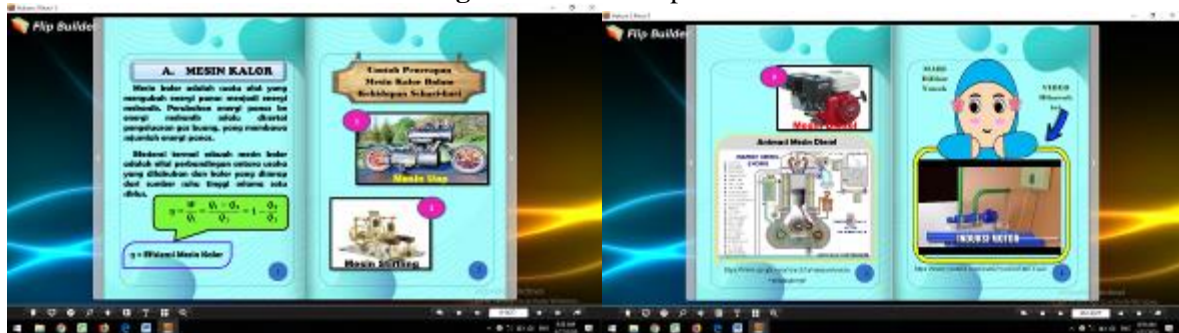


Figure 3. Content Material



Figure 4. Crossword Puzzle

- The third stage is the development stage, at this stage, the Inquiry-Based Pocket Book (PBBI) media has been assessed by media experts and material experts. Suggestions and criticisms from media experts and material experts are used to revise the PBBI media that has been made so that it is suitable for use. The results of the recapitulation of the validation of media experts and material experts are

presented in the following Table 2 and Table 3.

**Table 2.** Media Expert Validation Results

Rating Indicator	Score	Component	Vulnerable Score	Classification
Cover Design	50	15	3,33	So Worth It
Content Design	77	24	3,21	Worthy
Design View	41	12	3,42	So Worth It
Media Presentation	26	9	2,89	Worthy
Amount	194	60		Worthy
Average Score		3,23		

**Table 3.** Material Expert Validation Results

Rating Indicator	Score	Component	Vulnerable Score	Classification
Aspect of Material Suitability with KI, KD, and Objectives	47	15	3,13	Worthy
Aspect Language	39	12	3,25	Worthy
Amount	86	27		Worthy
Average Score		3,18		

The tables above show the results of the assessments of media experts and material experts. The results of media expert validation show that the Inquiry-Based Pocket Book learning media (PBBI) has a vulnerable average score of 3.23 which is included in the feasible category. Some notes on the results of media expert validation include a) incomplete wording, b) use of sentences that are simpler and easier to understand, and c) more attractive pictures and more regular arrangement. The results of the assessment from material experts showed that the average score was 3.18 which was included in the appropriate category. Some notes on the results of material expert validation include a) providing information after the equation, b) images adapted to the theme, c) using terms or sentences that are easy to understand, and d) punctuation marks and words that are not precise and complete.

- The fourth stage is the implementation stage, at this stage, the Inquiry-Based Pocket Book (PBBI) media was tested on teachers and students of class XI science at MA Mambaul Ulum Jombang with 17 students and MA Ghozaliyah Jombang with 18 students. Student responses were then used to revise the PBBI. The results of teacher responses and student responses can be seen in Table 4 and Table 5.

**Table 5.** Results of Teacher Response Questionnaire Recapitulation

No	Questions	Result	Classification
1.	The attractiveness of the pocketbook display for students to study	3	Worthy
2.	The clarity of the writing on the pocketbook	3	Worthy
3.	Grammar and sentence structure in the pocketbook is easy for students to understand	3	Worthy
4.	The suitability of the material in the pocketbook with the subject matter of Basic Competence (KD)	3,5	So Worth It
5.	The suitability of the material presented in the pocketbook with the learning objectives to be achieved	3,5	So Worth It
6.	The presentation of pictures and colors on pocketbook media is interesting	2,5	Not Worth It
7.	The presentation of animations and videos on pocketbook media is clear and the layout is appropriate	3	Worthy
8.	Pocketbook media can increase students' knowledge	3,5	So Worth It
9.	The material in the pocketbook media presented is easy to understand	3	Worthy
10	Examples of application in everyday life are presented following the material	3,5	So Worth It
	Total	31,5	
	Average	3,15	Worthy

**Table 6.** Results of Student Response Questionnaire Recapitulation

Questions	Score	Component	Rating Score	Classification
This pocketbook is very interesting	117	35	3,34	So Worth It
The description of the material in this pocketbook is easy to understand	106	35	3,03	Worthy
The language used in this pocketbook is easy to understand	103	35	2,94	Worthy
The pictures used in the pocketbook are appropriate and clear with the material being discussed	118	35	3,37	So Worth It
The colors used in this pocketbook are attractive	118	35	3,37	So Worth It
The letters in this pocketbook are easy to read	112	35	3,20	Worthy
The sentences in this pocketbook are easy to read	112	35	3,20	Worthy
The animations presented are interesting	120	35	3,42	So Worth It
The video presented can improve understanding of the law of thermodynamics	110	35	3,14	Worthy
The attractiveness of pocketbook can be increase enthusiasm for learning	113	35	3,23	Worthy
<b>Total</b>	1129	350		Worthy
<b>Average</b>	3,23			

Overall, from the results of the teacher's response questionnaire, it was found that the average score was 3.15 with a decent level of feasibility. While the results of the overall student response questionnaire from the two schools obtained an average score of 3.23 with a decent level of feasibility. This shows that this inquiry-based pocketbook learning media can be used as a medium for learning Physics for class XI on the material of the Law of Thermodynamics.

- The last stage is the evaluation of the Inquiry-Based Pocket Book (PBBI) learning media obtained from the results of student response questionnaires and student scientific literacy test answer sheets after studying thermodynamics material using PBBI media.

## Discussion

The development research carried out aims to describe the design and feasibility of inquiry-based pocketbook learning media (PBBI) for thermodynamic physics learning. This was done to determine the design and feasibility of PBBI learning media to help students be active and confident in understanding thermodynamics physics subjects. (Khumaidi & Imam, 2018) stated that the mobile pocketbook is suitable to be used to support physics learning because the media developed is effectively used as a physics learning medium. The pocket book is collaborated using an inquiry-based approach. The inquiry-based approach is a student-centered approach (student-centered approach) by conditioning students to control the situation at hand (Prasetyo, 2010).

Several factors need to be considered in this study, namely a) the number of samples used in 2 classes with a total of 35 students, b) the implementation of learning media in 2 classes was used as a comparison. This is made so that the research becomes strong and good in terms of analysis. The results of research in the development of PBBI learning media have several advantages and disadvantages. The advantages of this media, namely 1) interesting media background, 2) contains KI, KD, and indicators, 3) contains animations and learning videos, 4) can be opened anytime and anywhere with a cellphone, laptop, or computer, and 5) there is the crossword puzzle. In addition, the weaknesses of this media are: 1) crossword puzzles on PBBI media cannot be filled indirectly.

Learning media using Flipbook has an impact on the learning process in the classroom. One of them is to facilitate learning and the benefits of Flipbook are used to help students understand the lesson (F. B. Putra et al., 2017; I. A. Putra & Sujarwanto, 2017). Flipbooks are also used to increase students' interest in physics subjects (Ramdania, 2013; Sugianto et al., 2013). (Mulyadi et al., 2016) stated that Flipbook media can improve students' creative thinking skills. Flipbook also has several advantages including; can present learning material in the form of words, sentences, and pictures, can be equipped with colors so that it is more attractive to students, easy to make and cheap, easy to carry everywhere, and can increase student learning activities (Susilana & Nonoh, 2008).

## CONCLUSION

The results of this study indicate that the Inquiry-Based Pocket Book (PBBI) learning media that was developed received a proper classification. The results of the product feasibility test were carried out by media experts who received an average score of 3.23 with a feasible classification and material experts who received an average score of 3.18 with a feasible classification. The results of the readability test were obtained from the teacher's response questionnaire who got an average score of 3.15 with a proper classification and student response questionnaires who got an average score of 3.23 with a proper classification. The hope in this research can be used in the learning process.

Based on the results of research that has been carried out, there are several suggestions related to this media, namely: 1) making PBBI media is expected not only on thermodynamic material but can be developed on other materials, 2) making PBBI learning media can continue to be improved because of research results shows that this media is suitable to be used as one of the interesting learning media.

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