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The Development of Illustrated Pocket Book as a Source of Independent Learning in Indra's System Material in XIth Grade of High School Natural Science Program

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ABSTRACT

Learning resources are a component needed in teaching and learning activities. One example of a learning resources often used by teachers and students is books. This study aims to develop a pocket book with a sensory system as a source of independent learning and to determine the effectiveness of a sensory system illustrated pocket book on student learning outcomes in the XIth Grade High School Natural Science Program. This type of research is Research and Development using the 4D Thiagarajan model (*Define, Design, Development and Dissemination*). The effectiveness test used a quasi experimental method with the pretest post-test control group design. The data obtained were both quantitative and qualitative. The results of the validation by material experts scored 95.9 (very feasible), language experts scored 90.77 (very feasible), and layout design experts scored 83.48 (very feasible). The results of the response by the Biology teacher were 99.58 (very feasible), and the results of student responses on individual tests were 97.78, small group tests were 98, and limited field tests were 99.72 under very feasible category. The effectiveness of sensory system illustrated pocket book is seen based on the students' Biology learning outcomes, t-test and N-gain value. The results showed that the sensory system illustrated pocket book as an independent learning resource was very feasible to use in biology learning and was quite effective in improving student learning outcomes in the XIth Grade of High School Natural Science Program.

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PENDAHULUAN

Learning resources are one of the components needed in learning activities. Learning resources are something that is available in a learning environment that functions to help the learning process for both teachers and students (Pohan *et al*., 2018). Learning resources can provide experiences in learning. With the existence of learning resources, individuals can acquire knowledge, attitudes, beliefs, emotions, and feelings. Learning resources also play a role as a medium of communication between teachers and students in learning. Learning resources consist of materials that can be utilized and needed in the learning process such as textbooks/ printed media, electronic media, resource persons

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and an environment that can increase student activity in the learning process (Sitepu, 2014).

Books are one of the most used and easiest learning resources. Until now, textbooks are still the main learning resource in the learning process in schools, both for teachers and students (Ami *et al*., 2012). Students use books as a means to support their self-development. The use of books as a learning resource requires students to read and understand the subject matter presented (Suryanda *et al*., 2019). Textbooks on the market have a relatively large size (25 cm x 17 cm) and have relatively long reading descriptions on each page. Most of these books use very few pictures and colors and therefore look less attractive (Ami *et al*., 2012). Some students rarely use textbooks because they are reluctant to carry large text-books. This is one of the reasons for the low level of reading interest among students (Saputra *et al*., 2018).

Based on the results of observations made on biology teachers and students at SMA Negeri (Public Senior High School) 1 Percut Sei Tuan, it was found that teachers and students at the school used textbooks as the main learning resource in the learning process. The use of textbooks is considered ineffective because there are still many students who are reluctant to repeat lessons all over again, both at school and at home. Students also do not prepare enough during lessons and will only study for an upcoming test/exam, and thus their learning outcomes are often compromised. This is proven by the fact that 40% of the students' scores in Biology are still below the Minimum Completion Criteria score of 75. In addition, the results of the needs analysis questionnaire show that students want additional learning resources in the form of books with a more attractive appearance, material that is easy to understand and is equipped with colorful and practical pictures to carry and use when they want to study anywhere and anytime. Teachers also want additional learning resources in addition to textbooks. For this reason, additional books are needed to support textbooks that are easy to carry, have short reading descriptions on each page and with an attractive appearance that are presented in the form of a pocket book.

A pocket book is a small book that can be stored in a pocket and easy to carry around. Pocket books are designed in an attractive and practical way to help students study anytime and anywhere (Sulistyani *et al*., 2013). The pocket book's appearance makes use of lots of pictures and colors to make it attractive. Students prefer texts with a few descriptions but with lots of pictures or colors. Pictures can increase reading interest because they assist readers' imagination (Ami *et al*., 2012). Imagination can help a person improve their memory performance and memorize verbal terms (Slavin, 2012). Color can also be a form of non-verbal communication that can convey messages in an instant and more meaningful way (Ami *et al*., 2012).

The Biology material chosen in the development of this illustrated pocket book is the sensory system. In terms of sensory system material, there are many pictures that must be presented clearly and completely. With a sensory system illustrated pocket book, students can observe pictures, ask for information, play games, reason or associate existing materials and pictures, and communicate or make conclusions about the information that has been obtained on the sensory system material. This is in accordance with the demands of the 2013 Curriculum which requires learning to lead to empowering all potential students to become competent human beings in life (Dion, 2014).

Based on this study, a research with the title "The Development of Illustrated Pocket Books as a Source of Independent Learning in the Sensory System Material in the XIth Grade High School Natural Science Program" was conducted with the purpose of developing a sensory system illustrated pocket book as a source of independent learning and determining its effectiveness on learning outcomes of students in the XIth Grade High School Natural Science Program.

METODE

This study is a research and development conducted using the 4D model developed by Thiagarajan with the stages of Define, Design, Development, and Dissemination (Sugiyono, 2019); (Thiagarajan *et al*., 1974). The purpose of this study is to develop a sensory system illustrated pocket book as a source of independent learning and to determine the effectiveness of a

sensory system illustrated pocket book on student learning outcomes in the XIth Grade High School Natural Science Program. The effectiveness of the sensory system illustrated pocket book illustrated by the students' Biology learning outcomes, t-test and N-gain value.

Research Venue

This research was conducted at one of the public high schools in Percut Sei Tuan District, Deli Serdang Regency, namely SMA Negeri 1 Percut Sei Tuan, which is located at Irian Barat street. The research was conducted from January 2020 to July 2020. The student response test to the product developed was carried out at SMA Negeri 13 Medan, while the test of the effectiveness of sensory system illustrated pocket books was carried out in the XIth Grade Natural Science Program of SMA Negeri 1 Percut Sei Tuan.

Procedure

The procedure in this study uses the Thiagarajan 4D development model which consists of 4 stages, namely Define, Design, Development, and Dissemination. The define stage is useful for determining and defining needs in the learning process and gathering relevant information related to the product to be developed. The design stage aims to select a learning product that can be used as an independent learning resource and also as a support for Biology textbooks on the sensory system material. The development stage is the process of producing a development product from the initial design that has been designed. The dissemination stage aims to disseminate books and test the effectiveness of the books being developed. Following are the steps in developing a sensory system illustrated pocket book based on the Thiagarajan 4D model (Figure 1).

The feasibility of the sensory system illustrated pocket book is assessed based on the guidelines issued by BSNP (2014) which include aspects of content and presentation feasibility, aspects of language feasibility, and aspects of graphic feasibility. There are four instruments used in this study, namely: (1) a scaled questionnaire sheet for book validation by three experts (material expert, language expert, and layout design expert); (2) a scaled questionnaire sheet for the assessment (response) of Biology teachers; (3) a scaled questionnaire sheet for student responses; and (4) multiple choice questions, totaling 25 questions.

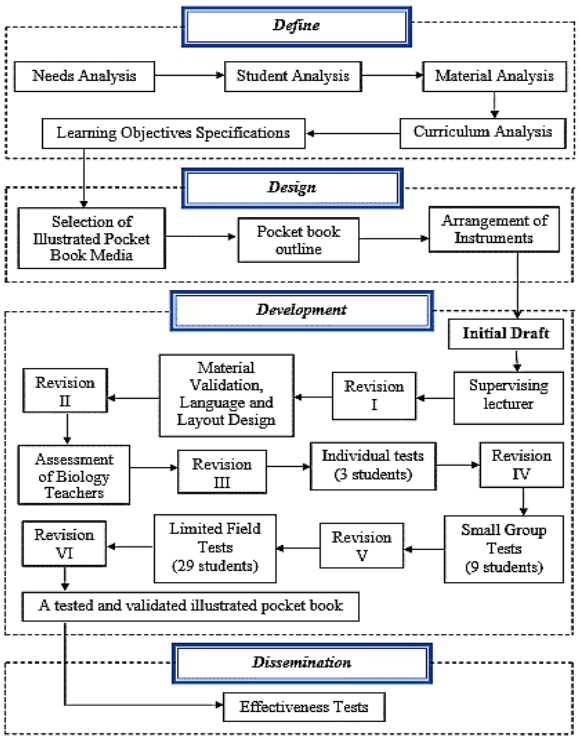

Figure 1. Steps to develop a sensory system illustrated pocket book based on the Thiagarajan 4D model.

There are two types of data obtained in this study, namely quantitative and qualitative data. Quantitative data in the form of validation by 3 expert lecturers (material, language, and layout design experts), biology teacher assessments, and student responses to sensory system illustrated pocket book that were being developed. Meanwhile, qualitative data is in the form of suggestions and input from 3 expert lecturers (material experts, language experts and layout design experts) as well as suggestions and input from Biology teachers and students.

Data Analysis

The data analysis used in this study came from the book's feasibility data according to three validation experts (material experts, linguists, layout design experts), test respondents (biology teachers and students), and data on book effectiveness. Determination of the feasibility

criteria or category of the developed illustrated pocket book is done by calculating the feasibility value and respondent test of each data, both from the validation of the illustrated pocket book by three validation experts (material experts, language expert, layout design expert), assessments from biology teachers and student response data. The feasibility data obtained in the form of a score using a Likert scale is converted into a value form. Changing the feasibility data for the illustrated pocket book is carried out with the following formula:

$$= \frac{\sum Q}{\sum R} \times 100$$

Description:
P : The value obtained for each component or aspect of the observed assessment.
∑Q : The number of scores obtained by each component / aspect of the observed assessment.
∑R : The maximum amount of scores for each component or aspect of the observed assessment.

(Ridwan, 2010).

Furthermore, data analysis from 3 validation experts as well as respondents (Biology teachers and students) was simplified into a form that was easier to read and interpreted in order to obtain conclusions about the illustrated pocket book that was developed. The book feasibility criteria can be seen in Table 1.

Table 1. Book Feasibility Criteria

Achievement Level	Predicate	Category
81 – 100	Very Good	Very Feasible
61 – 80	Good	Feasible
41 – 60	Good enough	Feasible enough
21 – 40	Not good enough	Not feasible enough
0 – 20	Not Good	Not Feasible

The data analysis of the effectiveness of the illustrated pocket book was obtained from the pretest and post-test data of students in the biology lesson of the sensory system material. The pre-test and post-test data that had been collected were subsequently analyzed to determine student learning outcomes using the developed illustrated pocket book (as well as using the Biology textbook) and without using the illustrated pocket book (using only Biology textbooks). The pre-test and post-test data that had been collected were then analyzed to determine student learning outcomes using illustrated pocket book and without using the developed illustrated pocket book. The pretest and post-test data were analyzed in two stages, namely the t-test and the N-gain test using MS software program *Excel 2016* and *IBM SPSS Statistic 22*. The formula for finding Normalized gain (N-gain) by Meltzer (2002) is as follows:

$$< g > = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ maksimum - Skor\ Posttest}$$

The results of the N-gain calculation are then classified according to the gain index category <g> specified in Table 2. Furthermore, the results of the N-gain value can be presented with the interpreted category of the percentage of N-gain effectiveness as in Table 3.

Table 2. N-Gain Value Category

N-gain Value	Category
g ≥ 0,70	High
0,30 < g < 0,70	Medium
g ≤ 0,30	Low

Source: Hake (2002)

Table 3. N-gain Effectiveness Percentage Interpretation Category

Percentage (%)	Criteria
< 40	Ineffective
40 – 55	Less Effective
56 – 75	Fairly Effective
> 76	Effective

Source: Hake (1998)

RESULT AND DISCUSSION

Define Stage

The define stage consists of analyzing the needs of students and teachers, student analysis, material analysis, curriculum analysis, and specification of learning objectives. Analysis of

student and teacher needs was carried out by providing a needs questionnaire to 158 students of XIth Grade of High School Natural Science Program and also interviewing Biology teachers at SMA Negeri 1 Percut Sei Tuan in January 2020. Material analysis was carried out by looking at Biology materials that were considered difficult for students. One of the Biology materials chosen in this development research is the sensory system material. The curriculum analysis was carried out by examining the curriculum used in the studied school. Furthermore, the specification of learning objectives can be obtained by looking at Basic Competencies (KD), Competency Achievement Indicators and learning objectives in the Biology learning tools for students of the XIth Grade of High School Natural Science program, namely the syllabus and lesson plans. Thus, the conclusion obtained from the results of the define stage is that it is very necessary to develop additional learning resources in the form of illustrated pocket books as a source of independent learning on the material of the sensory system in the XIth Grade of High School Natural Science program.

Design Stage

At the design stage, there is a selection and design of the product to be developed. The product chosen and designed is in the form of a sensory system illustrated pocket book as a source of independent learning in the XIth Grade of High School Natural Science. Then the initial design was carried out in the form of an outline of the developed illustrated pocket book. The illustrated pocket book developed is made on A6 size paper, which is 10.5 cm x 14.8 cm, and contains pictures. After the product type is determined and the product outline is designed, a research instrument is designed. The instrument designed consisted of product feasibility by expert validators, responses and responses by students and biology teachers, multiple choice questions and a questionnaire for student learning independence. The instrument that has been designed is then validated by an expert validator, namely Dr. Hasruddin, M.Pd., until it is declared feasible.

Development Stage

The development stage consists of several steps, namely: creating the initial draft of the research product, validating the pocket book by three validation expert lecturers (material experts, language experts, and layout design experts), biology teacher assessment (response), and student response testing. Student response tests were carried out in Natural Science XIth Grade of High School Negeri 13 Medan, which consisted of individual tests (3 students), small group tests (9 students), and limited field tests (29 students). The result of the final product developed is a "Sensory System Illustrated Pocket Book" which can be used as a source of independent learning in the XIth Grade of High School Natural Science program.

The sensory system illustrated pocket book was developed based on literature studies from high school Biology textbooks, journals and also articles related to the biology learning of the human sensory system material. The preparation of sensory system illustrated pocket books is adjusted to the criteria for making a pocket book. There are additional pictures in the pocket book to support and complement the existing materials. Below is a cover view and excerpts of sections from the sensory system illustrated pocket book (Figure 2).

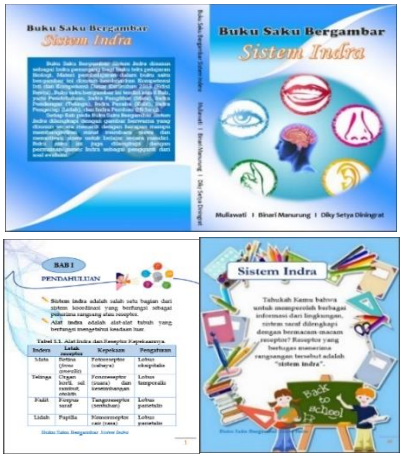

Figure 2. Views of the Cover and Sections of the Sensory System Illustrated Pocket Book.

Validation by Experts

The feasibility of the sensory system illustrated pocket book illustrated by expert validation involves three validation experts, namely material experts, linguists, and layout design experts. The feasibility of the illustrated pocket book that was developed includes aspects of content and presentation feasibility, aspects of language feasibility, and aspects of graphic feasibility. The feasibility of the contents and presentation of the sensory system illustrated pocket book that was developed was obtained from the evaluation of the material expert validator by Dr. Melva Silitonga, MS. The content and presentation feasibility aspect consists of sub-aspects of assessing the suitability of the material with KI, KD, and learning indicators, material completeness, material accuracy, material organization, certainty in Law and Legislation, presentation techniques, supporting material presentation, learning resentation, and completeness of the presentation.

The linguistic feasibility of the sensory system illustrated pocket book was obtained based on the assessment of the language expert validator by Mrs. Fitriani Lubis, S.Pd., M.Pd. The language feasibility aspect includes the sub-aspects of assessing student development, legibility, coherence, conformity with Indonesian language rules and the use of terms and symbols. Furthermore, the feasibility of the developed sensory system illustrated pocket book was obtained based on the evaluation of the book layout design expert validator by Dr. R. Mursid, S.T., M.Pd. The graphic feasibility aspect of the illustrated pocket book consists of several sub-aspects of assessment, namely book size, book cover design, and book content design. The following is a recapitulation of the results of validation of sensory system illustrated pocket book by three experts (Table 4).

Table 4. Recapitulation of the Assessment Results of the Sensory Pocket Book by Three Expert Validators

No	Evaluation Aspect	Average Score	Predicate	Category
1.	Content and presentation feasibility	95.44	Very Good	Very Feasible
2.	Linguistic feasibility	90.77	Very Good	Very Feasible
3.	Graphic feasibility	83.48	Very Good	Very Feasible

Based on the results in Table 4, it shows that the aspects of the feasibility of content and presentation by material experts scored an average of 95.44 with the predicate "Very Good" and belonging to the category "Very Feasible". The aspect of language feasibility by language experts scored an average of 90.77 with the predicate "Very Good" and belonging to the "Very Feasible" category. Meanwhile, the aspect of graphic feasibility by layout design experts scored an average of 83.48 with the predicate "Very Good" and classified in the "Very Feasible" category. Overall, the results of the validation of the three experts show that the sensory system illustrated pocket book as a source of independent learning is very feasible for use in learning Biology.

Biology Teacher Response

The Biology teacher's response to the developed sensory system illustrated pocket book was obtained from the assessment (response) by two Biology teachers at SMA Negeri 1 Percut Sei Tuan. The goal is to gain additional information on the four aspects being assessed, so that suggestions for better pocket book product improvement can be obtained. These aspects include content and presentation feasibility, language feasibility, and graphic feasibility.

The four aspects of the pocket book with the sensory system based on the assessment (response) of the Biology teacher obtained an average value of 99.58 with the predicate "Very Good" and classified in the "Very Feasible" category. The following is a recapituation of the results of evaluation of sensory system illustrated

pocket book according to Biology teacher's assessment (response) (Table 5).

Table 5. Recapitulation of the Assessment Results of the Sensory Pocket Book Based on the Response of the Biology Teacher

No.	Evaluation Aspect	Average Score	Predicate	Category
1.	Content feasibility	100	Very Good	Very Feasible
2.	Presentation feasibility	100	Very Good	Very Feasible
3.	Linguistic feasibility	98.75	Very Good	Very Feasible
4.	Graphic feasibility	99.57	Very Good	Very Feasible
Average		**99.58**	**Very Good**	**Very Feasible**

Student Response

The student response test was carried out in three stages, namely individual testing (3 students), small group testing (9 students) and limited field testing (29 students). The aspects assessed in the student response test include the illustrated Pocket Book's appearance, mastery of materials, learning motivation, and source of information. In addition, there are comments and suggestions about the sensory system illustrated pocket book that was developed. The following is a recapitulation of the results of students' responses to the sensory system illustrated pocket book (Table 6).

Table 6. Recapitulation of Student Responses to the Sensory System Illustrated Pocket Book

No.	Evaluation Aspect	Value			Predicate	Category
		Individual Test	Small Group Test	Limited Field Test		
1.	Benefits of Illustrated Pocket Book	100	100	100	Very Good	Very Feasible
2.	Material Presentation	91.69	96.11	98.97	Very Good	Very Feasible
3.	Learning Motivation	100	100	100	Very Good	Very Feasible
4.	Benefits of the Illustrated Pocket Book	100	100	100	Very Good	Very Feasible
Average		**97.78**	**98.96**	**99.72**	**Very Good**	**Very Feasible**

Based on Table 6, it shows that the aspects of the feasibility of content and presentation by material experts scored an average of 97.78 with the predicate "Very Good" and belonging to the category "Very Feasible". The small group test scored an average of 98 with the predicate "Very Good" and classified in the "Very Feasible" category, and in the limited field test it was 99.72 with the predicate "Very Good" and classified in the "Very Feasible" category.

Dissemination Stage

After the development stage is complete, the dissemination stage is carried out. At the dissemination stage, an effectiveness test was also carried out to determine the effectiveness of using a sensory system illustrated pocket book as a source of independent learning in the XIth Grade of High School Natural Science Program. The dissemination was carried out in a limited manner by distributing sensory system illustrated pocket books to an entire class of XIth grade Natural Science Program at SMA Negeri 1 Percut Sei Tuan. The effectiveness test of the sensory system illustrated pocket book used the quasi experimental design method in the form of a pretest-posttest control group design in which there were two groups, namely the experimental group / class and the control group / class. In this design, both the experimental group and the control group were given a pretest, then given different treatment, and then given a final test (post-test). The number of questions given at the pretest and post-test was 25 multiple choice questions.

Book Effectiveness Test

The book effectiveness test aims to determine the effectiveness of illustrated pocket books as a source of independent learning on the sensory system material in XIth Grade of High School Natural Science Program. The effectiveness of sensory system illustrated pocket book is seen from the results of XIth Grade Natural Science Program students of SMA Negeri 1 Percut Sei Tuan on the sensory system material, the t test and the N-gain value.

Student learning outcomes

Student learning outcomes were obtained from analysis of students' pretest and post-test data. Student pretest and post-test data collection was carried out by assigning scores to each question. Correct answers are given a score of 1, and incorrect answers are given a score of 0. The following are the results of the pretest and post-test students of the experimental class and the control class at the distribution stage (Table 7).

Table 7. Pretest and Post-test Data for the Experiment Class and Control Class

Origin of Data	Overall Score		Overall Value		Average Score	
	Pretest	*Post-test*	*Pretest*	*Post-test*	*Pretest*	*Post-test*
Experimental Class	300	636	1200	2544	38.71	82.06
Control class	316	563	1264	2252	40.77	72.65

The t-test (t-test) aims to determine whether or not there is a difference in the average post-test score of the experimental class and the average post-test score of the control class. The following are the results of the statistical test (t-test) of the average post-test score of the experimental class and the average post-test score of the control class (Table 8).

Table 8. Date are the results of the statistical test (t-test) of the average post-test score of the experimental class and the average post-test score of the control class

Origin of Data	Average Score *Post-test*	Standard deviation	t_{count}	Sig. (2-tailed)
Experimental Class	82.06	7.07	5.211	0.000
Control class	72.65	7.16		

Based on the results of the t test calculation in Table 7, the t value is 5,211; P ≤ 0.000, with the mean post-test score for the experimental class, namely 82.06 ± 7.07 and the average post-test score for the control class, namely 72.65 ± 7.16. Therefore it can be concluded that there are significant differences in student learning outcomes taught using a sensory system illustrated pocket book and without sensory system illustrated pocket book.

The N-gain test carried out at the dissemination stage aims to determine the effectiveness of the illustrated pocket book developed for improving student learning outcomes on the sensory system material in XIth Grade of High School Natural Science Program. The N-gain test involves the pretest and post-test scores of the experimental class and the control class. The following are the results of the N-gain test statistics for the experimental class and control class (Table 9).

Table 9. Data on the results of the N-Gain statistical test in the experimental class and control class

Origin of Data	N-gain Score		N-gain Percentage (%)	
	Total N-gain Score	Average N-gain score	Total N-gain Percentage (%)	Average N-gain Percentage (%)
Experimental Class	22.24	0.72	2,224.21	71.75
Control class	16.78	0.54	1,677.50	54.11

Based on the data from the results of the N-gain calculation in Table 9, the average N-gain score in the experimental class is 0.72, which is in the "High" category, and the average N-gain percent (%) is 71.75. % in the “Fairly Effective” category. Meanwhile, in the control class, the average N-gain score was 0.54 in the "Medium" category and the average N-gain percent (%) was 54.11% in the "Less Effective" category. These results indicate that the sensory system illustrated pocket book is quite effective in improving student learning outcomes on the sensory system material in XIth grade of High School Natural Science Program.

Discussion

This independent learning resource in the form of sensory system illustrated pocket book was developed by referring to the 4D model development model developed by Thiagarajan with the stages of Define, Design, Development, and Dissemination (Sugiyono, 2019; Thiagarajan *et al*., 1974). There are two data analysis techniques used in this study, namely quantitative data analysis techniques and qualitative data analysis techniques. The data obtained in this study came from the book's feasibility data according to three validation experts (material experts, linguists, layout design experts), test respondents (biology teachers and students), and book effectiveness data.

Based on the results of the validation of the pocket book with the senses system by three validation experts, the highest average value of the pocketbook feasibility came from the material expert's validation, namely 95.44, in the aspect of content and presentation feasibility. The next highest average feasibility value is obtained from the validation of linguists, namely 90.77 in the aspect of language feasibility. While the lowest average feasibility value is obtained from the validation of the layout design expert with an average value of 83.48 in the graphic feasibility aspect. The level of achievement of the feasibility criteria for the sensory system illustrated pocket book is in the range of 81 - 100. This means that the pocket book with the sensory system is classified into the predicate "Very Good" with the category "Very Feasible" based on the book's feasibility criteria by Sugiyono (2013). This shows that all the components presented in the pocket book with the sensory system picture are suitable for use in learning and as an additional learning resource for Biology textbooks.

The description of the material presented in the sensory system pocket book is shorter than the Biology textbook without reducing the important information elements in the material. The material presented in the pocket book with the sensory system pictured is adjusted to the Basic Competence, competency achievement indicators and pursuit objectives in the Biology learning device for class XI IPA SMA, the sensory system material, namely the Syllabus and RPP. This is in accordance with the opinion of Prastowo (2012) which states that the criteria for good teaching materials are as the substance of the material has relevance to the basic competencies that must be mastered by students, the material in the complete book, at least provides a complete explanation such as a definition or summary, solid in knowledge and has a clear scientific sequence, the correctness of the material can be accounted for, short and clear sentences, and their physical appearance is attractive or motivates them to read.

The sensory system illustrated pocket book is also equipped with pictures adapted to the material and has an interesting color combination. The image size is adjusted to the size of the paper used in the illustrated pocket book. According to Natali and Lakoro (2012), the existence of feasible image illustrations is able to explain the information written in the book, so that readers can understand the material in depth. In line with this, Ami *et al*. (2012) explained that illustrations can increase reading interest because they help readers with their imagination. Imagination in turn can help a person improve their memory performance and memorize verbal terms (Slavin, 2012).

The use of language in the sensory system illustrated pocket book is based on aspects of student development, legibility, coherence, conformity with Indonesian language rules and proper use of terms and symbols. This is in line with research conducted by Ulfa *et al*., (2013) that the use of good language is adjusted to Indonesian grammar rules and refers to Enhanced Spelling of the Indonesian language. Likewise with the research of Rahmawati *et al*. (2016) that the choice of language in learning media must pay attention to good and correct Indonesian principles such as the use of spelling, word writing, and punctuation. Furthermore, according to Widodo (2008) which states that consistency must be met in terms of the form, letters, words and sentences of each page. Sapta (2009) in Rahmawati *et al.* (2013) also states that good teaching materials are teaching materials written in good and easy to understand language, presented attractively, equipped with pictures and descriptions.

The design of the cover layout and contents of the pocket book with the sensory system is made attractive with a variety of color combinations so that users of the illustrated pocket book would not feel bored. Anna in Ami *et al*. (2012) states that color can be a form of non-verbal communication that can convey messages instantly and in a more meaningful way. The same thing is also conveyed by Arsyad (2016) that color is used as a tool to guide and attract attention to important information and to distinguish each component. Furthermore, based on Kurniasari's (2014) research, the use of a book cover that reflects and is in accordance with the contents of the book can attract reading interest and make it easier for readers to find out the contents of the book.

Overall, the assessment (response) of the Biology teacher to the feasibility of the sensory system illustrated pocket book is that the sensory system illustrated pocket book is very feasible and interesting to read. Especially as a supporting book for Class XI High School Biology text lessons and as a source of independent learning for students. The cover of the sensory system illustrated pocket book is also very interesting the design displays a title, an illustration of the sensory organs and use a background with a matching color. As explained by Susilana *et al*., (2008) that one of the efforts that can be made to make learning media more attractive is to use a variety of colors. This color will make students interested in studying the learning material, focus on the presentation of the material, and make the presentation of the material more lively.

In addition, the sensory system illustrated pocket book is equipped with colorful and neatly arranged pictures to complement the presentation of the material description in the pocket book. This is in accordance with the opinion of Arsyad (2016) that the combination of text and images on a printed page can increase attractiveness and can facilitate understanding of information presented in two formats, verbal and visual. The main purpose of the appearance of these various types of images is to visualize the concept that the concept is trying to convey to students.

The results of the feasibility test (response) of students to the pocket book with the sense system, both in the one-on-one (individual) test, the small group test, and on the limited field test, it was found that the display aspects of the pocket book with the sensory system picture, the learning motivation aspect, and the benefit aspects of illustrated pocket book has the same score of 100. Meanwhile, the lowest average value was obtained by the material presentation aspect. But overall, the level of achievement of the feasibility criteria for the sensory system illustrated pocket book is based on the feasibility test (response) of students is in the range 81-100. This means that the sensory system illustrated pocket book is classified as "Very Good" with the category "Very Feasible" based on the book's feasibility criteria by Sugiyono (2013).

All students in the student's feasibility test (response) stated that they liked and were interested in the appearance and content of the sensory system illustrated pocket book. Moreover, the pocket book is equipped with colorful and neatly arranged pictures to complement the presentation of the material description in the pocket book. This is supported by Wardani's research in Rahmawati *et al*., (2013)

which concluded that students tend to like interesting readings with few descriptions and lots of pictures or colors. In line with this, Sulistyani *et al*., (2013) explained that the benefits of pocket books as learning media are that the delivery of material can be uniformed, making the learning process clearer, fun and attractive because the design is printed in many colors, efficient in time and energy, fostering positive attitudes towards the material and learning process so that students can develop their potential to become independent learners.

The effectiveness of the sensory system illustrated pocket book illustrated by looking at students' biology learning outcomes on the sensory system material, the t test and the N-gain value. Based on the results of biology learning among the XIth Grade of High School Natural Science Program students of SMA Negeri 1 Percut Sei Tuan, it was found that in the experimental class, the average pretest score was 38.71 with an average minimum score of 24 and an average maximum value of 56. Furthermore, the average post-test score was 82.06 with an average minimum score of 68 and an average maximum value of 92. While in the control class, the average pretest score was 40.07 with an average minimum score of 24 and an average maximum value of 56. Next, the average post-test score was 72.65 with an average minimum score of 60 and an average maximum value of 84. These results indicate that the use of the sensory system illustrated pocket book in the experimental class can improve student learning outcomes based on the results of students' pretest and post-test scores. The results of the research by Pohan *et al*., (2015) show that the use of a pocket book on the classification of living things can improve students' understanding of this material which is marked by improved student learning outcomes. In line with this, based on the results of research by Khulafa and Santoso (2018), pocket books as a learning medium for making Jumput Batik in Multicultural Art and Scarf Subjects are feasible to use and are able to improve student learning outcomes.

The results of the t-test calculation obtained the value of $t_{count} = 5.211$; $P \leq 0.000$, with the mean post-test score for the experimental class of 82.06 ± 7.07 and the average post-test score for the control class, namely 72.65 ± 7.16. Therefore, it can be concluded that there is a significant difference between the learning outcomes of students who are taught using pictorial pocket books and without using pictorial pocket books in the Biology subject matter of the sensory system material. This is in line with the research results of Sulistyani *et al*., (2013) which showed that students in the experimental class who used pocket books had better learning outcomes than students in control classes who did not use pocket books (instead they used a conventional textbook). The pocket book also encourages students to study independently.

The results of the N-gain calculation in this study obtained an average N-gain score in the experimental class, namely 0.72 in the "High" category and the average N-gain percent (%) obtained 71.75% in the "Fairly Effective" category. . Meanwhile, in the control class, the average N-gain was 0.54 in the "Medium" category and the average N-gain percent (%) was 54.11% in the "Less Effective" category. These results indicate that the sensory system illustrated pocket book is quite effective in improving student learning outcomes on the sensory system material in XIth grade of High School Natural Science Program. This is supported by the results of research by Muhammad *et al*., (2015) which show that the developed pocket book on respiratory system material is classified as valid, practical, and effective. The learning outcomes of all students have also passed the learning mastery standards. In line with this, based on the results of Masita and Wulandari's (2018) research, it shows that mind mapping-based handbooks in science learning, heat material and its transfer have been tested effectively because they can improve student learning outcomes and are proven to be practically used in learning.

Basically, pocket books are the same as textbooks, which distinguishes them in terms of size and presentation. The sensory system

illustrated pocket book presentation developed in this study uses a lot of illustration and color combinations to give it an attractive appearance. The use of illustrated pocket books can encourage students to study independently and improve student learning outcomes (Saputra *et al*., 2018). Students tend to like reading materials that are interesting with little description but with a full explanation and lots of pictures or colors (Lisa *et al*., 2015).

Pocket books are a form of printed media with its own advantages and disadvantages (Susilana *et al*., 2008). The advantages of pocket books are able to present messages or information in large quantities, messages or information can be learned by students according to the needs of their respective interests and speed, can be learned anytime and anywhere because it is easy to carry, it will be more attractive if it is equipped with pictures and colors, easy remedies / revisions. Whereas the disadvantages of the pocket book are as the manufacturing process takes a long time, printed pocket books are usually thicker than textbooks, if the binding and paper are bad, the printed material will be easily damaged and torn.

CONCLUSION

Based on the results of the development of sensory system illustrated pocket book, it can be concluded that the sensory system illustrated pocket book as an independent learning resource developed is very suitable for use in Biology learning of sensory system material in XIth Grade of High School Natural Science Program based on validation by three experts (material expert, language expert, layout design expert) and also respondent test (Biology teacher and students' responses). The sensory system illustrated pocket book that was developed was also quite effective in improving student biology learning outcomes on the sensory system material in XIth Grade of High School Natural Science Program.

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