

## Development of Interactive *E-Books* Oriented Towards Science Literacy Skills on Immune System Material

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### Abstract

*This research aims to get interactive e-book learning media oriented to science literacy skills on immune system material. The e-book learning criteria produced in this study have been valid, practical, and effective. This type of research is development research that uses 4D models (Define, Design, Develop, Disseminate). This study used 6 instruments, namely: interview instruments, validation instruments, student response instruments, learning implementation assessment instruments, student activity assessment instruments, and learning outcome assessment instruments (pre-test and post-test). The results found that the validity test based on the assessment results of validators of material experts, media experts, question experts and teachers obtained  $\bar{x}$  scores of 98%, 97%, 93.33% and 91.33% (very good) respectively. The practicality test for the results of learning implementation in this study was the first meeting and the second meeting got a score of  $\bar{x}$  97%, the results of student activities in the first and second meetings got a score of  $\bar{x}$  respectively 87%, and 90%, and the results of student responses in this study got a score  $\bar{x}$  is 86% (all of those results belong to the "very practical" category). The effectiveness test based on the results of N-Gain analysis in this study received a value of 0.80 (effective). The author concludes that the interactive e-book developed is valid, practical, and effectively used in the biology learning process at SMA Negeri 2 Gorontalo*

**Keywords:** *E-book, Science Literacy Skills, Research Development*



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### INTRODUCTION

Education is the most important aspect that human beings need. A form of education, humans can improve the qualities and abilities that exist in themselves. Education has a role to explore the potential and abilities that can be obtained through the teaching and learning process, one of which is in literacy activities. Science literacy is essential to use in helping students build their knowledge and abilities. Science literacy

known as scientific literacy can be defined as the capacity to understand, convey (orally or in writing), and apply scientific knowledge to problem-solving situations, enabling students to develop the mindset and skills necessary to base judgments on scientific information (Yuliati, 2017).

The PISA (*Programme for International Student Assessment*) survey organized by the OECD (*Organisations for Economic Cooperation and development*) stated that from 2000-2018 Indonesia was a group of countries with minimal scientific levels because it was assessed on average below the OECD which was 501. In connection with that, there is a need for innovation that supports the learning process to help students train scientific literacy. One of them is the use of learning media such as interactive *e-books* (Narut & Canisius, 2019).

*Interactive e-books* are learning media used to help students understand a lesson that is clear and abstract in the form of documents with text, images, graphics, and videos bundled in the form of e-books to attract students' attention in learning. *Interactive e-books* designed with student needs in mind can help the learning process become better and not boring even though learning is carried out independently and can increase students' science literacy skills (Ramdani et al., 2020). Based on problems found during an interview at SMAN 2 Gorontalo with one of the class XI teachers where the immune system is part of the subjects taught in high school biology subjects. This material is abstract material so that students themselves must analyze and relate it to the conditions around them and related to environmental conditions. This material is quite dense material so it takes a lot of time to explain it. As for when the evaluation of students was carried out, only 65% met the KKM.

The immune system material is expected to be able to develop students' literacy-based competencies, so as to be able to prepare today's generation with *soft skills* and *hard skills*. In accordance with the objectives of science learning, mastery and use of science appropriately helps students understand science in a general scope, especially in the surrounding environment (Rizkita, 2016). Based on these problems, improving scientific understanding skills of the human immune system material is used interactive *e-books*. *Interactive e-books* turned out to be able to improve students' scientific abilities. This case is supported by the literature of Firdausy & Setiawan (2017), which states that the application of learning media in the form of interactive *e-books* can increase scientific knowledge. *Interactive e-books* can be created using a wide variety of applications. But in making *e-books*, students' needs must be considered, one of which is science literacy ability. In this case, the application that is suitable to use is *Flip PDF Professional*. This is according to the literature of Watin & Kustijono (2017), which states that the *Flip PDF Professional* application is very effective for training scientific processing skills / abilities and has the potential to make them need to be developed.

## **METHOD**

This type of research is development research with 4D models (*define, design, develop, disseminate*). This research was carried out in the odd semester of 2021/2022. At SMA Negeri 2 Gorontalo which is located at Jl. Rambutan, Buladu, Kota Barat District,

Gorontalo City with the subjects of the study were class XI students. Data collection in the research development of this evaluation instrument is carried out in several ways, namely validation, student response questionnaires, and student learning outcomes tests.

### Validity Test Analysis

Data obtained from the validation results of interactive *e-book* learning media oriented to science literacy skills in the form of qualitative descriptive data and quantitative data. Qualitative descriptive data comes from validators' suggestions and comments. Quantitative data comes from the assessment aspect using check-list (√) with assessment criteria in Table 1. as follows.

**Table 1.** Judging Criteria *Source by* (Permatasari, 2018)

Criterion	Score
Very Good (SB)	4
Good (B)	3
Simply (C)	2
Less (K)	1

Furthermore, the data obtained from the validation results were analyzed using percentage data analysis techniques with formulas referring to (Yazid, 2016) as follows.

$$P (\%) = \frac{\text{Total score for each aspect}}{\sum \text{Maksimum Score}} \times 100\%$$

**Table 2.** Validator Assessment Score Interpretation *Source by* (Marta 2019)

Validity Value (%)	Criteria
90-100	Highly Valid
80-89	Valid
60-79	Quite Valid
0-59	Invalid

### Practicality Test Analysis

Analysis of the practicality of interactive *e-books* is measured by taking student response questionnaires, assessing learning implementation, and assessing student activities. The assessment of student response questionnaires, learning implementation, and student activities in the form of check-list (√) with assessment criteria can be seen in the practical aspects of interactive *e-book* learning media oriented to science literacy skills calculated by a formula referring to (Yazid, 2016) as follows.

$$P (\%) = \frac{\sum \text{Validation Score}}{\sum \text{Maksimum Score}} \times 100\%$$

The practicality criteria of interactive *e-books* can be interpreted using the media practicality percentage criteria table. Table of criteria for percentage of media practicality, can be seen in Table 3.

**Table 3.** Media Practicality Percentage Criteria (Source by (Azis, 2019))

No	Percentage (%)	Criteria
1.	0-20	Impractical
2.	21-40	Less practical
3.	41-60	Quite practical
4.	61-80	Practical
5.	81-100	Very practical

### Effectiveness Test Analysis

#### *Learning Outcomes Test (Science Literacy Ability Analysis)*

Analysis of science literacy skills or student learning outcomes can be obtained by determining learning completeness which can be calculated using a formula referring to (Rianti, 2018) as follows:

$$\text{Final Score} = \frac{\text{Acquisition score}}{\text{Maximum score}} \times 100\%$$

The value of science literacy ability obtained from the calculation is then categorized according to the following table 4,

**Table 4.** Categories Science Literacy Ability of Students, Source (Mawaddah, 2015)

Value	Category
85,00 – 100	Excellent
70,00 – 84,99	Good
55,00 – 69,99	Enough
40,00 – 54,99	Less
0 – 39,99	Very Lacking

#### *N-Gain Analysis*

N-gain analysis is needed to determine how effective e-books are oriented towards science literacy skills, using a formula that refers to Permatasari et al., (2017), namely *Normalized Gain* :

$$N - \text{Gain} = \frac{\text{value posttest} - \text{value pretest}}{\text{Score maximum} - \text{value pretest}}$$

The effectiveness criteria of the e-book can be interpreted using the Normalized Gain category table. Table of *Normalized Gain* categories, can be seen in Table 5,

**Table 5.** Categories Interpretation of N-Gain Effectiveness Source by Hake (1999)

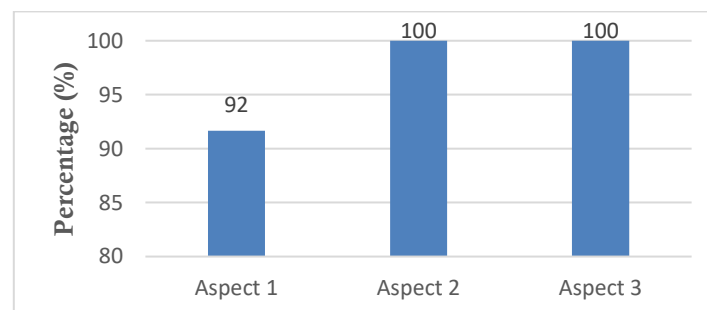
Percentage (%)	Tinterpretation
<40	Ineffective
40-55	Less Effective
56-75	Quite Effective
76	Effective

## RESULTS AND DISCUSSION

Based on the results of the research obtained, namely the development of interactive e-books using *Flip Pdf Professional* on the body's defense system material which will be discussed based on the research objectives, namely the validity, practicality and effectiveness of interactive *e-books*.

### *Validity Test Analysis*

The assessment by Drs. Mustamin Ibrahim, M.Si as a material expert validator lecturer refers to 4 aspects, namely the feasibility of content, feasibility and completeness of presentation, language feasibility, and *literacy-oriented e-books*. The results of validation by material experts can be seen in Figure 1.



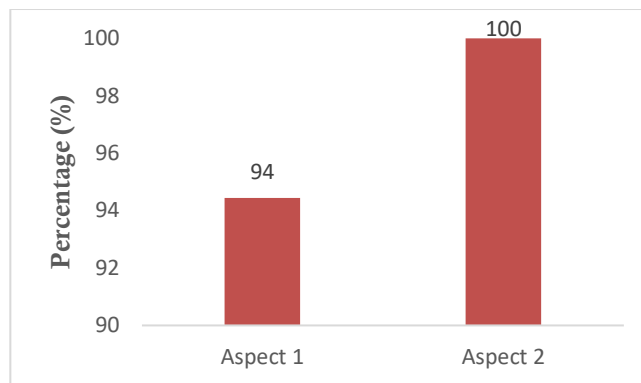
**Figure 1.** Material Expert Validation Results

Figure Information: Aspect 1= Content Eligibility; Aspect 2= Eligibility and completeness of presentation; Aspect 3= Language Eligibility

Based on the picture above, it can be seen that the validation of material experts obtained the following values: in the feasibility aspect of the content obtained a value of 92%, the feasibility and completeness aspect of presentation obtained a value of 100%, the language feasibility aspect obtained a value of 100% and the aspect of *literacy ability-oriented e-books* obtained a value of 100%. Thus, the results of material expert validation are obtained on an overall average of 98% with the "valid" criterion.

### *Media Expert Validation Results*

The assessment by Drs. Mustamin Ibrahim, M.Si as a media expert validator lecturer refers to 2 aspects, namely software engineering and presentation components. The results of validation by media experts can be seen in Figure 2. Based on the picture above, it can be seen that the results of media expert validation obtained the following values: in the software engineering aspect, a value of 94% was obtained and the presentation component aspect obtained a value of 100%. Thus, the results of media expert validation obtained an overall average of 97% with the "valid" criterion.

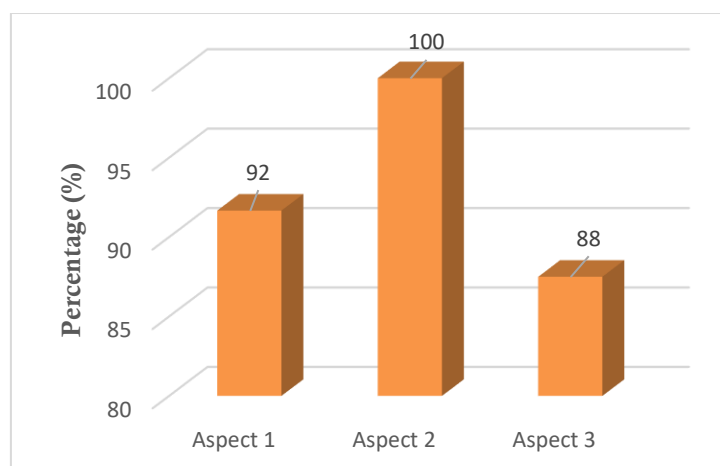


**Figure 2.** Media Expert Validation Results

Figure Information: Aspect 1= Software Engineering; Aspect 2= Serving Components

### **Question Validation**

Assessment by Mrs. Prof. Dr. Elya Nusantari M.Pd as a lecturer validator of questions that refer to 3 aspects, namely material, construction and language. The results of validation by question experts can be seen in Figure 3.



**Figure 3.** Question Expert Validation Results

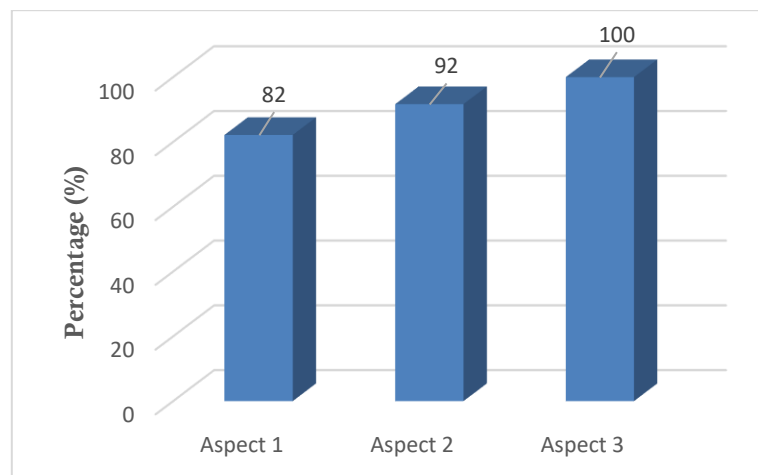
Figure Information: Aspect 1= Material; Aspect 2= Construction; Aspect 3= Language

Based on the picture above, it can be seen that teacher validation obtained the following scores: in the feasibility aspect of the material obtained a value of 92%, the construction aspect obtained a value of 100%, and the language aspect obtained a value of 88%. Thus, the results of teacher validation obtained an overall average of 93.33% with the "valid" criterion.

### **Teacher Validation**

Product assessment by practitioners (teachers) refers to 3 aspects, namely software engineering, presentation components, and science literacy. The results of validation by practitioners (teachers) can be seen in Figure 4, Based on the picture above, it can be seen that teacher validation obtained the following scores: in the software engineering aspect,

a score of 82% was obtained, the presentation component aspect obtained a value of 92% and the science literacy aspect of 100%. Thus, the results of teacher validation obtained an overall average of 91.33% with the "valid" criteria.



**Figure 4.** Teacher Validation Results

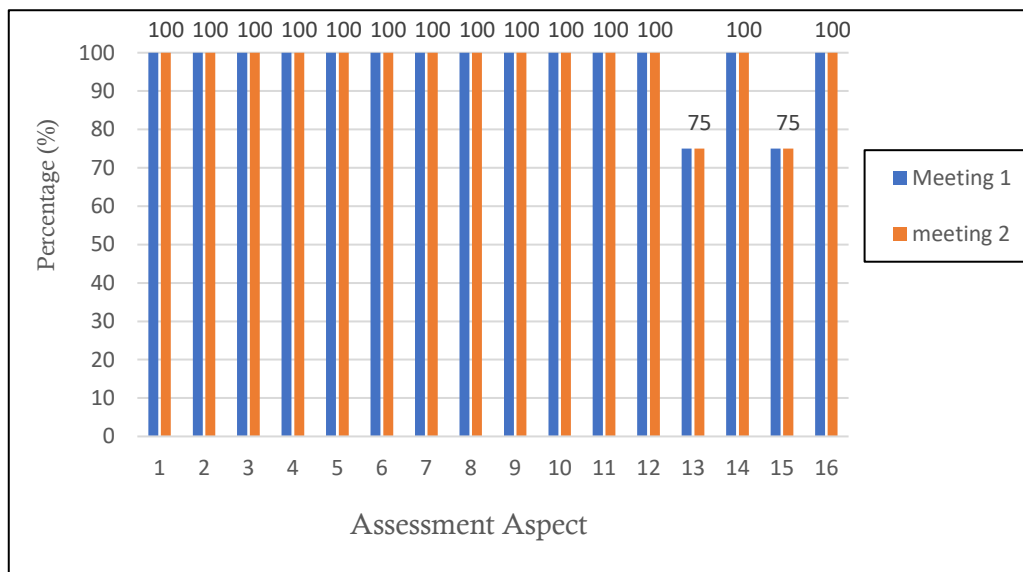
Figure Information: Aspect 1= Software Engineering; Aspect 2= Serving Components; Aspect 3= Science Literacy

#### ***Implementation of Teacher Activities***

Assessment of learning implementation is carried out by observers, when the learning process using e-books is in progress, by checking scores based on the results of observations (observations) on the assessment instruments that have been distributed. The following results of the assessment of learning implementation (teacher activities) at meeting 1 and meeting 2 are presented in Figure 5.

Management of the implementation of teacher activities is carried out by observation or observers in the ongoing learning process by filling out the check list on the instruments that have been given. In this assessment the assessment criteria are 1 (Less), 2 (Sufficient), 3 (Good), 4 (Very Good). In aspects 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16 obtained very good criteria, namely with a value of 4 in the range of percentage values of 80%-100% while in aspects 13 and 15 obtained good criteria, namely with a value of 3 in vulnerable percentage values of 61%-80%.

In the calculation results, it is known that there are several aspects that must be improved, especially in the aspect of providing conclusions on the results of student discussions and presentations and giving awards to groups that have presented the results of their discussions. In addition, adjustments are needed when giving post-tests through interactive e-books because students still need guidance when doing post-tests.



**Figure 5.** Results of Assessment of Teacher Activity Implementation

Figure Information:

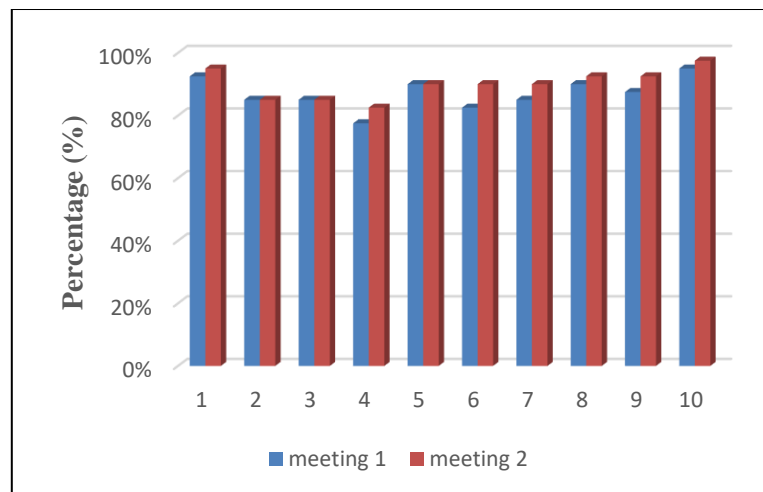
1. Greeting, praying conditioning the class, and checking the attendance of students
2. Provide Pre-test
3. Provide perception and motivation to students
4. The teacher explains the topic of discussion and conveys the KD and learning objectives to be achieved
5. Teachers ask learners to look at pictures and watch videos about immune system material on interactive e-books
6. Teachers provide opportunities for students to ask questions about the pictures and videos displayed
7. The teacher guides the learners to divide the group
8. Teacher Distributes Worksheets to each group
9. The teacher guides students to do worksheets in each group and gives a time v limit for working on group assignments

10. Guiding students in working on worksheets on group assignments
11. The teacher asks the group representative to present the results of the group discussion in front of the class
12. Provide opportunities for non-presenting groups to ask questions or respond to the results of the presentation
13. Confirmation from the teacher about the results of student discussions and presentations and giving awards to groups that have presented the results of their discussions
14. Teachers and learners reflect on learning outcomes.
15. Teachers give post-test through interactive e-book
16. Closing the lesson with greetings and saying hamdalah

### ***Student Activities***

Student activities are used to determine the practicality of interactive e-books oriented towards science literacy skills carried out by researchers using observation sheets of student activities. The percentage of observations of student activities in 2 meetings can be seen in the following figure 6.





**Figure 6.** Graph of Student Activity Assessment Results

Figure Information:

Aspect 1: Pre-test ;

Aspect 2: Observing apperception ;

Aspect 3: Read or watch videos about the body's defense system material in the e-book ;

Aspect 4: Read examples of problems in the e-book ;

Aspect 5: Answering questions related to example problems;

Aspect 6: Have a discussion with friends 1 group

- and write down the results of the discussion on a worksheet;

Aspect 7: Presenting the results of group discussions ;

Aspect 8: Provide responses (in the form of additional material or questions) to the presenting group ;

Aspect 9: Summing up the learning material ;

Aspect 10: Post-test

Based on the graph above, it can be seen that there are differences in student learning activities in meeting 1 and meeting 2 in each aspect of the assessment instrument. Observation of student activities is carried out during the learning process by filling out the sheet provided by the researcher. In this assessment, the assessment criteria are 1 (Less), 2 (Sufficient), 3 (Good), 4 (Excellent). In meeting 1, all aspects obtained very good criteria, namely with a value of 4 in the range of percentage values of 80%-100%, except in aspect 4 of the assessment ranging from 61%-80% which is known that students do not understand examples of problems that exist in the body's defense system material so there needs to be special improvements in this aspect. Meeting 2 all aspects obtained very good criteria with a value of 4 in the range of percentage values of 80%-100%. The average of each meeting, namely meeting 1 obtained a score of 87% and meeting 2 in the range of 90% values, both of which are "very good" categories.

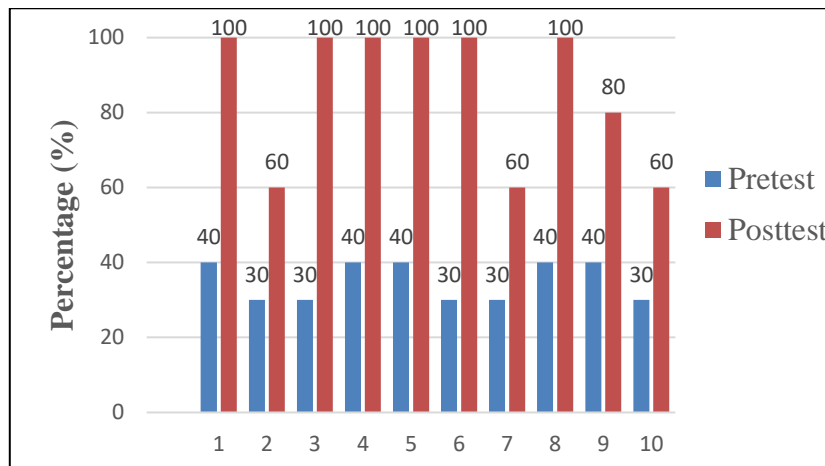
### **Results of Student Response Analysis**

Interactive e-book oriented towards science literacy skills developed and tested to 10 grade XI students of SMA Negeri 2 Gorontalo. The results of the questionnaire of students' responses to interactive e-books on immune system material developed showed interest in interactive e-books oriented towards science literacy skills. This can be seen from the average score on the student response questionnaire which is 86% and this range is included in the "very practical" category with a value range of 80%-100% so that it can be used as one of the learning media at SMA Negeri 2 Gorontalo

### *Student Learning Outcomes*

The pre-test and post-test questions given refer to aspects or grids of science literacy that are used as learning objectives to measure the level of ability of aspects of students' science literacy knowledge.

### *Pre-test and Post-test Results*

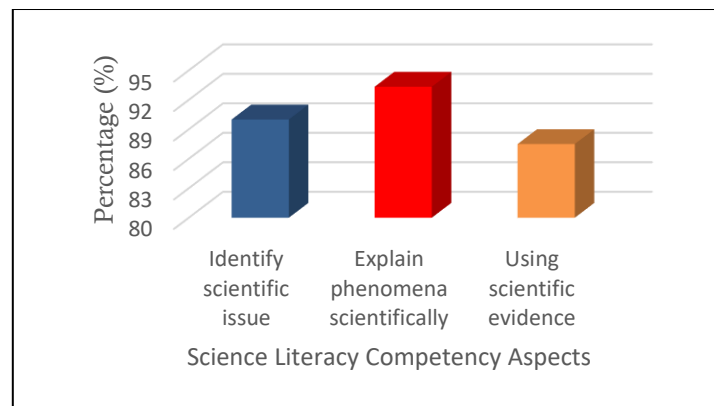


**Figure 7.** Pretest and Posttest Scores

The results of the pre-test assessment showed that 100% of students were incomplete, the highest score obtained was 40 and the lowest score was 30. This is because students have not mastered the material to be taught or students are less focused on doing the questions given related to aspects of scientific literacy, namely identifying scientific issues, explaining phenomena scientifically and using scientific evidence. Based on the results of the post-test test, the highest score is 100 and the lowest is 60. Students who get a score of 100 have understood problems related to aspects of science literacy, namely identifying scientific issues, explaining phenomena scientifically and using scientific evidence. Meanwhile, students who get a score of 60 mostly do not know how to use scientific evidence on existing questions.

### *Analysis of Aspects of Science Literacy Competency*

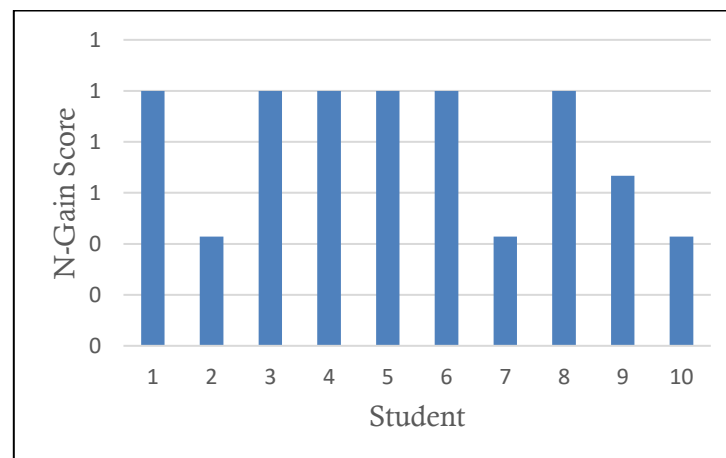
Analysis of aspects of science literacy competence is used to determine the science literacy ability of students in each aspect. Science literacy competence refers to three aspects, namely identifying scientific issues, explaining phenomena scientifically and using scientific evidence. Based on the calculation of the average score of each aspect of science literacy competence, the average value of each science literacy indicator is obtained as shown figure 8.



**Figure 8.** Graph of the Average Value of Science Literacy Competency Aspects

Based on Graph 4.13, the average score of the aspect of science literacy competence is obtained which shows that the highest average score is found in the aspect of explaining phenomena scientifically with an average acquisition of 93 where students are able to explain the problems that occur, describe the causes of the problems and can determine solutions to the problems listed. While the lowest average score is in the aspect of using scientific evidence with the acquisition of 88 where students do not know how to determine valid statements from scientific arguments, appropriate solutions of a discourse and draw rational conclusions.

#### *Interpretation of N-Gain Value*



**Figure 9.** N-Gain Value Chart

The acquisition of N-Gain scores consisting of 10 students in the interactive *e-book* trial showed a significant difference between *pretest* learning outcomes and *posttest* learning outcomes with the lowest N-Gain score obtained was 0.43 while the highest N-Gain score obtained was 1.00. The average number of student learning outcomes adapted that the value of students is 0.80 or  $g \geq 0.70$  is included in the high category which means the level of "effective".

This stage is carried out by researchers in a limited dissemination due to time constraints, and research costs. *The e-book* of the results of this research was distributed only at SMA Negeri 2 Gorontalo as a place of research, especially to teachers and class XI students. The results of the interactive e-book validation by the three validators obtained a data value of material validation obtained a value of 98% with very valid criteria, instrument validation of literacy questions obtained a value of 93.33% with very valid criteria, validation of the interactive e-book application as a learning medium obtained a value of 97% with very valid criteria and validation from biology teachers obtained a value of 91.33% with very valid criteria so that an average of 95% of the three validators were obtained.

Comments and suggestions from each validator will be used for the refinement of an interactive e-book product oriented towards science literacy skills on immune system materials. [Faradela & Abdul \(2020\)](#), stated that interactive e-book products developed to improve science literacy can be declared valid if the validity reaches  $\geq 61\%$ . This is in line with the statement of [Firdausy & Prasetyo \(2017\)](#), which revealed that integrating content such as images, animations, videos, interactive questions on interactive e-books can significantly improve students' science literacy skills. Based on the results of the validation test, the interactive e-book oriented towards science literacy skills on immune system material has met the set criteria so that it can be implemented in the learning process at SMA Negeri 2 Gorontalo.

The practicality of interactive e-books can be assessed through the results of assessment analysis of learning implementation observation sheets (teacher activities), student activities, and student response questionnaires. This is in line with the opinions of [Indriana & Mukhlis \(2021\)](#), who revealed that the practicality of e-books can be seen through student responses and observation of learning implementation. Observations are made during the learning process and data collection by each observer.

In the practicality test based on the results of the assessment of student activities, there were 2 meetings, where the first meeting obtained an average score of 87% and the second meeting obtained an average score of 90% and all aspects obtained scores with good criteria with the average score for the two meetings was 88% (very good). In improving student learning activities in every aspect of assessment, teachers must facilitate learning needs and strengthen motivation when learning the material provided can be understood by students. This is in accordance with the opinion of [Nyeneng et al. \(2018\)](#), which states that the class will be well managed because of the practicality of teachers in designing learning tools.

In the results of the implementation of activities, teachers get an average score of 97% with very good criteria. However, it is necessary to improve several aspects in the implementation of teacher activities, especially in the aspect of providing conclusions on the results of discussions. It is necessary to train learners to make conclusions and discussion results. In addition, adjustments are needed when giving post-tests through interactive e-books because students still need guidance when doing post-tests. This causes some aspects of teacher activity implementation to be low [Warsono \(2016\)](#), stated that teachers must be able to condition the class and students as much as possible in order to create a pleasant atmosphere so that the process of class management and learning

activities can be carried out, a pleasant learning atmosphere encourages high interest in learning.

According to [Fitriani & Holy \(2019\)](#), e-book-based learning media has good practicality criteria, if at least the level of practicality achieved is quite practical with a percentage range of 41 – 60%. If the level of practicality achievement below is quite practical, it is necessary to revise based on input or correction of practitioner validators and students. The response to the interactive e-book student questionnaire is included in the very good category with an average score of 86% so that it can be said that the interactive e-book is practical. Interactive E-books are declared practical if the percentage of positive responses from teachers and students reaches  $\geq 51\%$ . This opinion is also supported by [According to Fitriani & Holy \(2019\)](#), which states that e-book-based learning media have good practicality criteria, if at least the level of practicality achieved is quite practical with a percentage range of 41 – 60%. If the level of practicality achievement below is quite practical, it is necessary to revise based on the input or correction of practitioner validators and learners. Students as respondents in measuring the practicality of interactive e-books because learning media that are presented attractively are expected to be able to influence interest and motivation to learn in students. Interactive-based learning is able to build students' knowledge and motivation to learn supported by more interesting learning and abstract material visualized in animation media according to the development of science and technology ([Abadi, Pujiastuti, & Assaat, 2017](#)).

The effectiveness of interactive e-books oriented towards science literacy skills is declared effective because the learning objectives have been achieved by looking at the percentage of students' scores during the pre-test and post-test experiencing significant differences, namely obtaining a final score in the implementation of the evaluation using google form in the interactive e-book obtaining a score more or equal to the Minimum Completeness Criteria (KKM) set by the school. In effectiveness tests based on student learning outcomes in pre-test and post-test. The pre-test showed 100% of students were incomplete, the highest score was obtained which was 85 and the lowest score was 30. This is because students have not mastered the material to be taught and students are less focused on doing the questions given because the greater the confidence and motivation of student learning, the greater the scientific literacy achieved by students [Firdausy & Setiawan \(2017\)](#).

Post-test learning results show the highest score of 100 and the lowest score is 60 where there are several students who have not reached the Minimum Completeness Criteria (KKM) set by the teacher. Some things that cause students not to meet the KKM in the post-test are the ability of students to absorb different lessons, students who do not concentrate on doing the questions, the short duration of working on the questions. From the post-test results, there is an increase in learning outcomes after using interactive e-books in the learning process. This is because interactive e-books are designed in which there are videos, images and animations to be interesting so as to make students motivated so that they can practice their science literacy skills. This is supported by the opinion of [Firdausy & Setiawan \(2017\)](#) that the presentation of e-books equipped with interesting sounds, animations, and videos can stimulate students to learn the material so as to

increase students' science literacy skills which are directly proportional to the amount of interest and motivation of student learning.

Based on the results of [PISA research \(2015\)](#) states that the core of science literacy assessment lies in competency indicators consisting of 3 aspects, namely; 1) identify issues/questions scientifically, 2) explain phenomena scientifically, and 3) use scientific evidence. Based on the results of the analysis of aspects of science literacy competence, it shows that the highest value is found in aspect 2 explaining phenomena scientifically, which is 93, and the lowest is in aspect 1, identifying issues / questions scientifically, which is 88. This is also in line with the research of [Fauziah et al. \(2019\)](#), conducted on students of grade XI MAN 1 Mataram which showed the highest acquisition of scientific literacy competence in aspect 2 (explaining phenomena scientifically) and the lowest in aspect 3 (using scientific evidence).

The learning outcomes of pretest and posttest students will then be tested using t-Table. The significant value of the t-Table test results shows a significant difference between the learning outcomes of pretest and posttest students. This can be seen in (Table 4.6) which shows a significant value of 0.00; In the pretest the learning completeness test is only 10% and in the posttest the learning completeness reaches 80%. The results of participants were analyzed using N-gain, the N-gain interpretation had an average score of 0.70 with high criteria. According to [Agustin et al. \(2019\)](#), interactive e-books are said to be feasible if  $\geq 0.30$  is included in the medium category. Other literature states that N-Gain is the difference between pretest and posttest values ([Nirmalasari, 2016](#)). The opinion of Inzanah et al. (2014), states that the results of science literacy can be different if tests are carried out on a smaller scope. This happens because the influence of several factors, such as potential, regional characteristics, social and cultural communities and diverse Indonesian students, will influence learning aspects including students' science literacy abilities.

## CONCLUSION

The value of the menu validation test shows that the interactive e-book is oriented towards science literacy skills in the valid (feasible) category with the acquisition of an instrument score of 93% literacy questions, a material score of 98% and an interactive *e-book* application score of 9.7%. The practicality test score from the results of teacher activities got an average score of 9.7% with very good credit. The value of student activities was 2 meetings, the first meeting obtained an average score of 8.7% and the second meeting obtained an average score of 88% and all aspects obtained scores with good criteria. The results of student responses obtained an average score of 8.8% with the very good category. The effectiveness test was obtained from the test value of learning outcomes tested by t-table reaching significant values of  $0.00 < 0.05$ , the results of N-Gain after analysis were included in the high category because the average value was 0.80. Therefore, an interactive e-book directed at science literacy skills in immune system literature in a limited trial of 10 students can be used during learning at SMA Negeri 2 Gorontalo because it includes the "effective" criteria.

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