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Development of Blended Learning-Based Learning Tools to Practice Students' Scientific Argumentation Ability

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Abstract

The Covid-19 pandemic has resulted in a shift in the learning model from online to offline. As is the case with science lessons, especially in photosynthesis material where it is necessary to synchronize effective learning models in order to improve the stability of scientific argumentation. The purpose of this study is to produce Blended learning-based learning tools to train students' scientific argumentation skills. This research method uses the 4P method with a trial design using experimental research with the One Group Pretest Postest Design model. The results showed that (1) the learning devices used were included in the very valid category, (2) The practicality of the learning device was obtained from RPP 1 with a percentage of 95% (Online) and from RPP 1 with a percentage of 98% (Offline), and (3) The effectiveness of the learning device was reviewed from the argumentation value and the value of learning outcomes was included in the high category with a score obtained from student responses with a percentage of 94%.

Keywords
tools; learning; blended learning; argumentation; scientific

I. Introduction

Covid 19 pandemic caused all efforts not to be as maximal as expected (Sihombing and Nasib, 2020). The outbreak of this virus has an impact of a nation and Globally (Ningrum *et al*, 2020). The presence of Covid-19 as a pandemic certainly has an economic, social and psychological impact on society (Saleh and Mujahiddin, 2020).

Indonesia has been a country affected by the Covid-19 pandemic for two years. This serious problem attacks all sectors in Indonesia. The lack of face-to-face and all activities as much as possible are carried out online, which definitely has obstacles. One of the most affected by this pandemic is the education sector. This is because the learning process which was initially carried out for 6 days per week offline for now has to do online learning (online).

Please note that there are online learning systems in the form of synchronous and asynchronous. In online learning there is the term E-learning where learning uses computer-based media.Newspaper (2002)added that the use of electronic circuits such as (WAN, LAN, and Internet) is a tool used in E-Learning as a model for delivering interactions, learning processes, and guidance activities. Besides that,Kamarga (2002) explained that the e-learning model became a knowledge transfer activity using computer or electronic devices where the delivery was given as needed.

In Biology, the important role of scientific argumentation is to be able to improve critical thinking patterns in providing input, suggestions and criticism in a discussion in groups to see how far the skills, understanding concepts, and the ability to express scientific reasoning. In addition, scientific argumentation is also able to provide opportunities for students to be precise in defending arguments and be critical of the ideas

put forward by implementing the scientific method that has been obtained (Demircioğlu & Uçar, 2012).

One of the materials that is expected to be able to train scientific arguments is the Photosynthesis sub-material. According toMustaqim et al (2014)stated that there were still 38% of students who had misconceptions about photosynthesis. So that learning tools are still needed to train students' scientific arguments and to reduce misconceptions in students. Referring to the TAP theory, students are taught how to make scientific arguments theoretically, empirically and analytically by containing the 6 elements of Toulmin.

The study was conducted at Mujahidin High School Surabaya because researchers saw students at Mujahidin High School Surabaya not having the courage to argue or argue about the material being studied. The researcher as a teacher who has taught for approximately 3 years at Mujahidin High School so that he knows the background of students at Mujahidin High School Surabaya. In addition, researchers also obtained easy access to data at Mujahidin High School Surabaya.

In connection with the condition of Indonesia, especially in the education sector which is still struggling against the pandemic, the learning process is held online and meetings are limited. So, in this study, researchers developed a blended learning-based learning tool to train students' scientific argumentation skills in the Photosynthesis submaterial to adjust the learning process during a pandemic.

II. Research Method

2.1 Types of Research

This type of research is development research that produces learning device outputs that are suitable to be applied to distance learning programs and limited face-to-face meetings. The focus of development in this study is oriented to distance learning and limited face-to-face meetings using an inquiry learning model with Blended Learning learning strategies.

The development model used, namely the 4Ps includes the stages of define (defining), design (planning), develop (development) and disseminate (spread).(Ibrahim, 2002). The trial design of this study used a pre-experimental (One Group Pretest-Postest Design).

2.2 Research Time and Place

The development of the device was carried out at the Surabaya State University Postgraduate Science Study Program. The trial was carried out at SMAS Mujahidin Surabaya. This research will be carried out in the even semester of the 2021/2022 academic year located at the Postgraduate Science Study Program, State University of Surabaya.

2.3 Research Subject

The subject of this research is a learning device in the subject of Biology, the submaterial of Photosynthesis. The test subjects in this study were students of class XI IPA 1, XI IPA 2 and XI IPA 3 at SMA Mujahidin Surabaya. The number of trial samples in this study amounted to 45 students who were selected heterogeneously.

2.4 Research Procedure

The research on the development of Blended Learning-based learning tools to train scientific argumentation skills was carried out in two stages, namely (1) the learning device development phase and (2) the learning device trial phase.

First, the Learning Device Development Phase begins with developing the Learning Implementation Plan (RPP), Student Activity Sheets (LKPD), textbooks, instruments for assessing students' scientific argumentation abilities and instruments for assessing students' cognitive abilities (learning outcomes) using the 4P model.(Ibrahim, 2002). The research flow is visualized in Figure 1.

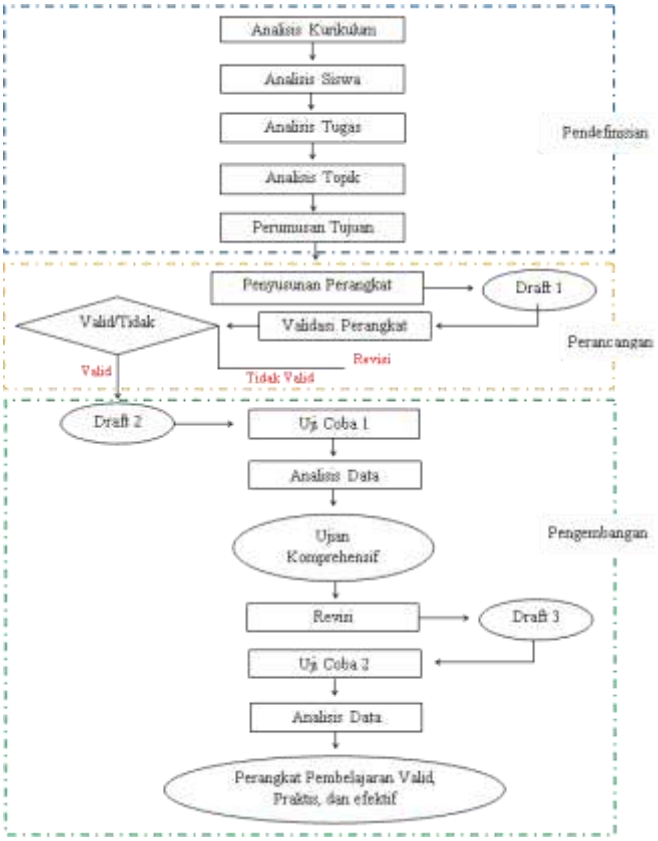


Figure 1. *Development of 4P learning tools according to (Ibrahim, 2002) which has been modified by researchers*

*Defining Stage*consists of several front and back analyzes or commonly referred to as needs analysis.

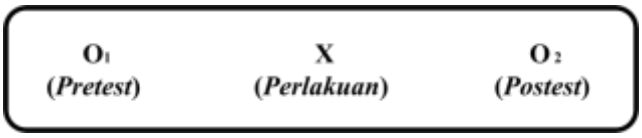
(1) Curriculum analysis as a form of identification of the basic constraints needed to identify the basic problems of developing learning tools, (2) Student analysis in the form of studying abilities, knowledge, background, and cognitive on student characteristics, (3) Task Analysis is the identification of the main abilities that must be developed. mastered by students, (4) Concept analysis, namely the elaboration of the main concepts that students will learn through blended learning-based learning to practice scientific argumentation skills, and (5) The results of task analysis and concept analysis are the basis for formulating specific learning objectives.

Design Stage, aims to design learning tools that will be developed. This stage consists of (1) Preparation of scientific argumentation ability tests, (2) Selection of tools and materials, and (3) Designing of early learning.

The initial design of learning begins with compiling learning tools in the form of drafts, at this stage the preparation of learning tools based on Blended learning is carried out. The scope of what will be taught is determined in the lesson plan. The learning experience in the lesson plans shows a series of learning that will be carried out in later learning. Researchers developed lesson plans, textbooks, LKPD, students' scientific argumentation ability test sheets, and students' cognitive ability test sheets (learning outcomes).

*Development Stage,*Activities at this stage are carried out by studying and evaluating the draft of learning tools by students and experts. There is validation by this expert for adjustments to conditions in the field (testing process at school) related to the learning tools developed. Suggestions and inputs from the validator are important in order to improve the results of the learning tools that have been developed prior to direct implementation in the field.

Second,*testing devices that have been developed.*The trial in this study used the One Group Pretest Posttest Design. The trial design can be described as in the pattern below.



Information:

O1 : Initial test (Pretest) scientific argumentation ability before the device is applied

X : Applying blended learning-based learning tools that have been developed.

O2 : Final test (Posttest) the ability of scientific argumentation after the device is applied

2.5 Data Collection Technique

Data collection techniques in this study include (1) Validation Techniques used to obtain data on the validity of the learning devices developed, (2) Observation/Observation techniques used to obtain data regarding student activities or activities during teaching and learning activities, (3) Tests which is used to measure students' scientific argumentation abilities and students' cognitive abilities (learning outcomes), (4) Lift distribution which is used to determine students' responses to the developed learning tools.

2.6 Data Analysis Technique

The data obtained in this study will then be analyzed according to the type of data itself. Data analysis in this study includes (1) analysis of the validity of the device, (2) analysis of the implementation of learning tools, (3) analysis of students' scientific argumentation ability tests, and (4) analysis of student responses.

*Device Validity Analysis*obtained from the validity data of learning devices which include lesson plans, (2) LKPD, (3) textbooks, (4) Student Scientific Argumentation Ability Test Sheets (4) Cognitive Ability Test (Learning Outcomes). These tools are then analyzed by averaging the scores obtained from the validators. The average value obtained from the validator is used to determine the quality of the developed device.

Table 1. Criteria for Learning Devices Based on the Value of the Validator

Interval nilai	Kriteria
>3,6	Sangat Valid
2,8 – 3,6	Valid
1,9 – 2,7	Tidak Valid
1,0 – 1,8	Sangat Tidak Valid

*Analysis of the implementation of learning tools*obtained data with a range of 1 - 4. The scores obtained from each meeting were averaged and then interpreted in the form of scores as follows:

Table 2. Criteria for RPP Implementation Score

Interval Skor Rata-Rata	Kriteria Skor Rata-Rata
1,0 – 1,8	Sangat Tidak Baik
1,9 – 2,7	Tidak Baik
2,8 – 3,6	Baik
>3,6	Sangat Baik

The reliability of the implementation of learning devices is said to be valid if the reliability value is 0.75 (Borich, 1996).

Analysis of Students' Argumentation Ability Test, analyzed using the rubric of scientific argumentation with a multilevel scale. Data on students' scientific argumentation abilities were analyzed using quantitative statistics in the form of percentages to describe the achievement of each learning indicator.

$$kemampuan\ argumentasi\ ilmiah = \frac{Skor\ yang\ diperoleh}{Skor\ total} \times 100$$

The results of the percentage of students' scientific argumentation abilities are then categorized based on the criteria below.

Table 3. Category of scientific argumentation ability

Skor Perolehan	Kategori
>81,25 - ≤100	Sangat Baik
<62,50 - ≤81,25	Baik
>43,75 - ≤62,50	Kurang Baik
>25,00 - ≤43,75	Sangat Kurang Baik

Changes in students' scientific argumentation test scores were analyzed using the N-Gain equation.

$$N - Gain = \frac{Skor\ postest - Skor\ pretest}{Skor\ maksimal - skor\ pretest}$$

Table 4. Criteria for changing the N-Gain . score

Rentang Skor	Keterangan
>0,70	Tinggi
0,30 – 0,70	Sedang
<0,30	Rendah

Student Response Analysis, obtained by distributing questionnaires to students. Calculated by the following formula

$$P = \frac{\Sigma K}{\Sigma N} \times 100\%$$

Information:

P : Persentase skor respon siswa

∑K : Jumlah siswa yang memilih jawaban YA atau TIDAK

∑N : Jumlah siswa yang mengisi angket

Table 5. Criteria for Percentage of Student Responses

Skor Perolehan	Kategori
>81,25 - ≤100	Sangat Baik
<62,50 - ≤81,25	Baik
>43,75 - ≤62,50	Kurang Baik
>25,00 - ≤43,75	Sangat Kurang Baik

III. Results and Discussion

3.1 Results

The research resulted in learning tools that have been developed in the form of textbooks, Learning Implementation Plans (RPP), cognitive ability test instruments (learning outcomes), students' scientific argumentation ability assessment instruments, and Student Activity Sheets (LKPD). This floating has been validated by two expert lecturers before being used in learning. Learning tools were developed with the aim of training students' scientific argumentation skills.

*Learning Implementation Plan (RPP)*which was developed by the researcher using the inquiry learning model and the Blended Learning learning strategy. The material used is photosynthesis in class XII odd semester. The lesson plans are made for two meetings with details of online meetings for 2 hours of lessons (2 x 30 minutes) and offline 2 hours of lessons (2 x 30 minutes). Online activities are carried out using WA group media, Google classroom, and Google meetings. Offline activities are carried out using an inquiry learning model, where students carry out practical experiments in the Biology Laboratory.

The learning syntax in the lesson plans contains the inquiry learning stage and scientific argumentation indicators. The stage of problem identification, problem formulation, and formulating hypotheses in the inquiry learning stage can train students' scientific argumentation skills on the Claim indicator (making a series of sentences or assumptions that are believed to be true). The stage of collecting data in the inquiry learning stage can train students' scientific argumentation skills on data indicators (finding facts that are used to prove claims). The data analysis stage in the inquiry learning stage can train students' scientific argumentation skills on warrant indicators (making logical statements that prove the relationship between claims and data),

*Textbooks*developed contains photosynthetic material. Textbooks have features, namely instructions for using books, keywords, and let's argue. The manual feature of the book contains indicators of scientific argumentation ability that must be done by students. The keyword feature contains important points that are discussed on each page in the textbook. The let's argue feature contains questions related to the material and contains indicators of scientific argumentation that must be answered by students. Students' answers are expected to be in accordance with the questions contained in the let's argue feature column, so there is an order to discuss with the teacher. The following is a cover image of

a photosynthetic textbook (Picture 2), the keyword feature (Picture 3) and the let's argue feature (Picture 4).

Figure 2. *Photosynthesis Textbook Cover*

Figure 3. *Keyword Features in Photosynthesis Textbook*

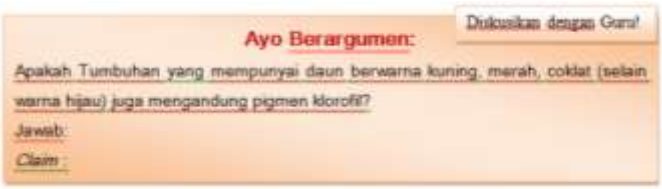


Figure 4. *Features Let's Argue on Photosynthesis Textbook*

*Student Activity Sheet (LKPD)*There are 2 LKPD developed. The first LKPD is about light spectrum and the second LKPD is about starch test on leaves. The light spectrum LKPD is used when meeting online. The worksheets are distributed through google classroom. LKPD contains stages of inquiry learning. LKPD contains instructions for using the virtual lab on light spectrum practicum. The problem identification inquiry stage is provided by an article in the understand me feature contained in the LKPD about the light spectrum. There are several questions to practice students' scientific argumentation skills.

The second LKPD is about starch test on leaves. This LKPD is used during offline meetings. LKPD contains an inquiry learning stage and questions that can train students' scientific argumentation skills. This LKPD is used by students as a guide in conducting practicum on starch testing on leaves at the School Biology Laboratory. The following is an image of the cover or front cover of the Student Activity Sheet (LKPD) that was developed.

Figure 5.*Cover LKPD Light Spectrum*

Figure 6.*Cover LKPD Amylum Test*

*Scientific Argumentation Ability Test Instrument*contains 5 questions in the form of essays on photosynthetic material which are arranged to train students' scientific argumentation skills. This instrument is used during pretest and posttest.

Meanwhile, the cognitive ability test instrument contains 15 questions in the form of 10 multiple-choice questions and 5 essay questions on photosynthetic material which are arranged to train students' scientific argumentation skills. This instrument is used during pretest and posttest. The validation results are presented in (Table 6) as follows.

Table 6. Learning Tool Validation Results

No.	Learning Tool	Validation Results
1	Learning Implementation Plan (RPP),	• Average overall score: 3.63 (Valid) • Percentage of approval: 87% (Reliable)
2	Textbooks	• Average overall score: 3.43 (Valid) • Percentage of approval: 96.29% (Reliable)
3	Student Activity Sheet (LKPD)	• Average overall score: 3.43 (Valid) • Percentage of approval: 96.29% (Reliable)
4	Instruments for assessing students' scientific argumentation abilities,	• Average overall score: 4 (Very Valid) • Percentage of approval: 100% (Reliable)
5	Cognitive ability test instrument (study results) Students	• Average overall score: 3.8 (Very Valid) • Percentage of approval: 100% (Reliable)

Furthermore, the implementation of learning is observed from the implementation of the learning steps in the lesson plan. The implementation of learning was observed 2 times, namely at the first meeting until the second meeting. Each meeting contains three main activities, namely preliminary, core, and closing activities where the learning steps have been arranged in such a way as to accommodate the steps of inquiry and indicators of scientific argumentation. The results of observing the implementation of RPP are presented in (Table 7)

Table 7. Results of Observation of RPP Implementation

Meeting 1	Practicality percentage analysis: 95% The lowest score is the percentage of RPP implementation: 90% (Phase 3 Formulating Problems)
Meeting 2	Practicality percentage analysis: 98% The lowest score of the percentage of RPP implementation: 90% (Stage 3 Student Presentation)

Next, the level of effectiveness of the learning device is measured from the results of the student's scientific argumentation ability test using a scientific argumentation test which contains 4 scientific reasoning indicators including 1) making a series of sentences or allegations that are believed to be true (claims), 2) finding or showing facts that are used to prove the claim (data), 3) make a logical statement that proves the relationship between the claim and the data (warrant), 4) make support that strengthens the warrant (backing) then draw conclusions. The test was carried out 2 times, namely before learning (Prestest) and after learning (Postest) in class XI IPA 1, XI IPA 2, and XI IPA 3. The results of the student's scientific argumentation ability test are presented as follows.

Table 8. Results of the N-Gain Score of Scientific Arguments Test

Class	N-Gain Score Value	Category
XI IPA 1	0.78	Tall
XI IPA 2	0.73	Tall
XI IPA 3	0.75	Tall

Table 9. Scientific Reasoning Indicator Values on Scientific Argument Test

Class	Test Type	Scientific Reasoning Indicator			
		Claim	*Data*	*Warrant*	*Backing*
XI IPA 1	Pretest	20	30	20	10
	Posttest	80	80	70	60
XI IPA 2	Pretest	20	10	10	10
	Posttest	70	70	60	50
XI IPA 2	Pretest	30	35	30	25
	Posttest	80	85	75	70

Table 10. Average Pretest and Posttest Scores of Scientific Argument Test

Class	Average Score	
	Pretest	Posttest
XI IPA 1	19.33	82.67
XI IPA 2	17	77.30
XI IPA 3	32.66	83.33

Students also perform a series of tests of cognitive abilities or what can be referred to as learning outcomes. In practice, each student did a pretest and posttest. Cognitive ability test results are presented as follows.

Table 11. Results of the N-Gain Score of the Cognitive Ability Test

Kelas	Nilai Skor N-Gain	Kategori
XI IPA 1	0,73	Tinggi
XI IPA 2	0,75	Tinggi
XI IPA 3	0,79	Tinggi

Table 12. Average Pretest and Posttest Scores of Scientific Argument Test

Class	Average Score	
	Pretest	Posttest
XI IPA 1	45.67	85.53
XI IPA 2	46.13	86,20
XI IPA 3	36.73	86.33

Based on the tests that have been carried out, several student responses were obtained through the distribution of lifts containing questions about the learning tools developed and the learning activities carried out. The results of student responses showed that the highest percentage of positive student responses was 100% and the lowest percentage of positive student responses was 80% with an average positive student response of 94.11%. In general, students agree that learning using inquiry is fun and can practice scientific argumentation skills. The photosynthetic textbooks and LKPD used by students during learning are felt by students to be able to help understand information and

procedures in experimental steps and contain interesting features with the use of understandable language.

3.2 Discussion

The learning tools used are the results of expert validation. First, the results of validation by validators of the developed lesson plans as shown in Table 6 indicate that the developed lesson plans have a valid category with an average score of 3.63. The developed lesson plans also obtained a percentage of matched assessments made by the two validators reaching 87% in the reliable category. The RPP assessed by the validator covers several aspects which are translated into indicators.

These aspects are the identity of the lesson plans, time allocation, learning indicators, learning objectives, learning materials, methods, learning resources, media, learning steps, components of practicing scientific argumentation, and assessment. The advice given is to add an indicator of scientific argumentation skills to be made explicit in the GPA and learning objectives. The second suggestion is that the inquiry learning syntax is still displayed in offline learning.

Second, the textbook before being used in learning is first assessed by the validator to find out the results of the validity test. The textbooks developed were assessed by two validators to determine their validity. Aspects assessed by the validator include the content feasibility component, the language component, and the presentation component. The results of the validation of the textbooks presented in Table 6 show that the textbooks developed have a valid category with an average score of 3.43.

The developed textbook has a percentage match between the two validators of 96.29%. There is an aspect that has the lowest average value is the linguistic aspect of the validator 2. The average value obtained is 3.11 which is included in the valid category. This is because the language used in the textbooks still contains a few sentences that are not in accordance with the Indonesian language rules according to the two validators. Overall, the validator believes that the developed book has met the requirements and is suitable for use if it is considered from the content component.

These results were obtained because the contents of the textbooks had been compiled based on the correct research procedures in accordance with the 4-D development model.Sitepu (2012)stated that in a textbook it is necessary to apply learning theory adapted to the nature of the students who are the target. This can be related to the material provided, the depth and breadth received by students(Katchevich et al., 2013). In addition, researchers also use various relevant and quality sources which are then studied in depth and compiled according to the curriculum that has been implemented.

The sub-components that train scientific argumentation skills get very good assessment results with all indicators getting a rating of 4 by the first validator while one indicator gets an assessment of 3 from the second validator. Both validators have the same assessment results on almost every indicator of scientific argumentation. These results were obtained because the researchers developed textbooks with various activities containing indicators of scientific argumentation.

There are activities to predict an experiment by applying indicators of scientific argumentation ability and there are experimental activities that require students to practice using their scientific argumentation skills in defending conclusions made from experimental results. The researcher also developed an open-ended question model that allows students to develop their reasons for corroborating the claims made. McNeill and Pimentel conducted a study by comparing a class that was given open-ended questions with a class that applied traditional learning to measure students' mastery of scientific

argumentation. The results showed that the experimental class had a higher argumentation ability(Wilson, 2016). Berland and Hammer argue that giving open-ended questions to practice argumentation skills is better than the traditional way(Duschl, RA, 2007). Based on the findings of D. khun showed that high-level argumentation skills are rarely mastered by children and even adults(Farida, 2015). This shows that the ability of scientific argumentation cannot be possessed by students spontaneously but must be trained.

The language component got an average score of 3 from the first validator and 3.2 from the second validator with a percentage agreement of 96.82%. The categories obtained from the first validator and the second validator are valid with a reliable percentage agreement. All indicators get a rating of 3 from the first validator. This is caused by the language used is not in accordance with the rules of the Indonesian language. These shortcomings have been corrected by researchers in developing the book. The second validator gives a score of 3 on all indicators except the indicator of the suitability of the illustration with the substance of the material and the ability to motivate students to respond to messages. This indicator gets a score of 4 because the illustration source is taken from the relevant textbook. In addition, each illustration describes the material described in the paragraphs equipped with image descriptions and references to the source from which the illustration was obtained. Overall, the language components of the developed book can be declared feasible and can be used in the learning process.

The presentation component got an average score of 3.42 from the first validator and 3.42 from the second validator with a percentage agreement of 95.24%. The categories obtained from the first validator and the second validator are valid with a reliable percentage agreement. There are five indicators that get 4 assessments from the first validator, namely the coherence of concepts, the accuracy of numbering and naming tables, pictures, and attachments, the ability to stimulate students' scientific argumentation, the availability of problem articles, and the existence of information on 4 domains of scientific argumentation on the components in question. The second validator gives a score of 3 on all indicators except the indicators of concept coherence, student involvement, student-centeredness, the ability to stimulate students' scientific argumentation, and the existence of a description of 4 domains of scientific argumentation on the component in question.

The validator provides suggestions for improvement of the textbook. Suggestions given by validators 1 and 2 are to add captions for images translated into Indonesian in the developed book and check writing according to the General Guidelines for Indonesian Spelling (PUEBI). The textbook has been revised according to the suggestions from the validator.

Third,the model used in the development of the LKPD is a guided inquiry model, so that the developed LKPD has two integrated characteristics. This causes the LKPD to reflect the character of guided inquiry. The indicators used to formulate questions as practice questions are indicators of scientific argumentation ability, which include claims, data, warrants, and backing.(Demircioglu & Ucar, 2015)

The Student Activity Sheet (LKPD) developed in this study is a practicum LKPD with light spectrum and starch test submaterials. The LKPD developed in this study consists of two LKPDs that will be used in four meetings. In the first meeting students will be given a pretest and initial knowledge about photosynthesis material, then at the second meeting students will discuss the light spectrum by doing activities according to LKPD 1. The third meeting students will discuss material about starch testing and carry out activities according to LKPD 2 about starch testing. The fourth meeting was used to conduct a posttest on the ability of scientific argumentation according to the material that had been studied.

The results of the LKPD validation as presented in Table 6 show that the LKPD has a very valid category with an average score of 3.69. The developed LKPD has a percentage match between the assessments of the 2 validators of 95.68% in the reliable category and slightly revised. Validators 1 and 2 provide suggestions for the purpose of training scientific arguments that need to be completed. The second suggestion is to add the author's name and bibliography to the developed LKPD.

Fourth,Scientific argumentation tests in the form of pretest and posttest with a total of 5 questions consisting of 10 questions in the form of essay questions. The material used in the pretest and posttest is different but has the same type. These two tests contain 4 indicators of scientific argumentation ability, including claims, data, warrants, and backing(Demircioglu & Ucar, 2015). The test instrument that has been developed is then validated by two validators.

The results of the test validation reached 4 with a very valid category. The percentage of match assessment of the 2 validators is 100%, which means reliable. Based on the results of the validation, the test instrument can be used in learning. The validator provides input for improvements to the developed test instrument, which is about the question editor.

Data indicators are indicators that require students to determine data supporting conclusions so that the conclusions made have strong real evidence. The research results certainly have a lot of data before being processed. Students are sometimes tricked into using raw data as a source for making conclusions. This is not appropriate and does not form the basis for making strong conclusions. The researcher only gives questions that lead students to show the proper use of data. This question is a determinant of students' analytical ability to the data obtained, so that research questions cannot specifically address the data in question.

Analysis of the level of practicality of learning in terms of the implementation process of lesson plans. The implementation of learning was observed 2 times, namely at the first meeting and the second meeting. Each meeting contains three main activities, namely preliminary, core, and closing activities where the learning steps are adapted to the inquiry syntax which aims to practice scientific argumentation skills.

In general, all the learning steps in the RPP have been carried out well. However, there were some obstacles that were found during the learning process. At the first meeting, students tend to be uncomfortable with the presence of the observer. This can be seen from the behavior of students who repeatedly look at the observer. This problem takes the concentration of students from the learning process because they are more focused on other things.

At the 2nd meeting, students were used to the presence of observers and there were no obstacles in terms of textbooks. However, at the time of the Sachs experiment, it took a longer time than the specified time allocation because the leaf selection did not pay attention to leaf thickness so it took more time to dissolve the leaf chlorophyll. The problems that occurred in this second meeting did not come from the inquiry learning device but from the students' own accuracy. So it can be concluded that at this second meeting the learning tools have been carried out well according to the previous plan. The implementation of the learning steps in the lesson plan shows that the inquiry syntax has been implemented well so that it can have an impact on the results of the assessment of students' scientific argumentation skills.

In addition, this research also discusses the effectiveness of learning tools. In this study using a Blended Learning strategy which is a learning model that combines face-to-face and non-face-to-face. The effectiveness of the learning tools developed in terms of

students' scientific argumentation skills and student responses. Where students' scientific argumentation skills are assessed using a scientific argumentation test and student responses are obtained from the distribution of student response questionnaires.

First,Students' scientific argumentation skills are tested using a scientific argumentation test which contains 4 indicators of scientific reasoning including 1) a series of sentences or allegations that are believed to be true (claims), 2) facts used to prove claims (data), 3) logical statements that prove the claim relationship with data (warrants), 4) support that strengthens warrants (backing) then draws conclusions.

. The test was carried out 2 times, namely before learning and after learning. Based on the results of students' scientific argumentation skills, it was found that the average n-gain of students, namely class XI IPA 1 was 0.73 high category, class XI IPA 2 was 0.75 high category and class XI IPA 3 was 0.79 high category.

Second,Cognitive ability test data can be obtained based on student learning outcomes on the cognitive ability test sheet. This cognitive ability test sheet is given before and after the learning process using learning tools that are being developed. Each sheet consists of 10 questions with multiple choice questions.

Cognitive ability tests were conducted twice, namely pretest and posttest. Based on the results of cognitive ability tests in general, it was found that class XI IPA 1 got an N-gain of 0.73, class XI IPA 2 got an N-gain value of 0.75, and class XI IPA 3 got an N-gain value of 0.79. . Of the three classes, class XI IPA 3 got a higher N-gain compared to the other two classes. However, the increase in scores between the pretest and posttest can indicate that the learning tools used can improve student learning outcomes.

Third, Student response data obtained through the distribution of student response questionnaires where the questionnaire contains questions that need to be answered with "Yes" or "No". Based on the results of student responses to the developed learning tools, the highest percentage of positive student responses was 100% and the lowest percentage of positive student responses was 80% with an average positive student response of 94.11%. In general, students agree that learning by using inquiry is fun and can practice scientific reasoning skills. The photosynthetic textbooks and worksheets used by students during learning are felt by students to be able to help in understanding the information and procedures in the experimental steps and contain interesting features with the use of easy-to-understand language.

Based on the results of student responses, 93.3% of students stated that the learning was fun. Therefore, fun learning can increase students' learning motivation so that it can have an impact on the achievement of student competencies.

IV. Conclusion

The validity of learning tools in the form of Learning Implementation Plans (RPP), Student Activity Sheets (LKPD), textbooks, scientific argumentation ability test instruments and cognitive ability test instruments (learning outcomes) are categorized as very valid. The results of the implementation of RPP obtained results of 95% in RPP 1 (Online) and 98% in RPP 2 (Offline). The effectiveness of learning tools in terms of the value of scientific arguments, the value of learning outcomes and student responses. The value of scientific argumentation and the value of learning outcomes show a high category, this means that learning tools can improve students' scientific argumentation skills. Student responses obtained a score of 94% indicating that the learning device received a positive response by students.

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