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Development of Integrated Students Worksheet for Contextual Teaching and Learning to Improve Student Science Literacy on Additive Material

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ABSTRACT

Students must have skills such as scientific literacy as part of the pattern of education in the 21st century. However, this is inversely proportional to the relatively low ability of students' scientific literacy in Indonesia. The use of student worksheets integrated with contextual teaching and learning (CTL) can be used in schools to improve students' scientific literacy skills. To improve students' science literacy, this study aims to develop a student worksheet integrated with contextual teaching and learning that is valid, feasible, and effective on additive materials. This research implements the 4D development model (define, design, develop, and disseminate). Data analysis shows that the student worksheets integrated with CTL is very valid with an average of 96.1% material validation and 93.7% media validation; feasible to use with an average of 76,65% practicality for teachers and 85,1% readability for students; and effective enough to use with the acquisition of N-gain showing a medium category with a value of 0,54. The student worksheets was also empirically tested through the Wilcoxon test and showed a significant difference between before and after the use of student worksheets integrated with CTL. Based on the research findings, it can be concluded that the student worksheets integrated with CTL to improve students' science literacy on additive material get a valid, feasible, and effective enough assessment.

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INTRODUCTION

The development of technology in the 21st century is developing very quickly. Of course, in the world of education, this development is a challenge for students in facing life in the future. According to Nisrina et al., (2020) stated that in this 21st century, skills in education are the main focus. Literacy skills are one of the skills that students must have (Arohman &; Priyandoko, 2016). Everyone has basic literacy skills. Beyond reading and writing, literacy can

be understood to include critical thinking, environmental awareness, and technological skills (Sari, 2018).

Studying science can help learners in facing the challenges of life in the 21st century. According to Pratiwi et al., (2019), stated that today science education is directed in facing the challenges of life in the 21st century. Science education plays an important role in students' knowledge related to the surrounding environment. Science education has the most important goal, which is the development of students' science literacy (Dragoş &; Mih, 2015).

Scientific knowledge used in everyday life is scientific literacy. In students' daily lives, decision making and problem solving are greatly helped by science literacy (Gultepe &; Kilic, 2015). Lucas (1983) argues that science literacy aims to help learners become more aware of scientific issues so that they use a scientific approach to solve these issues (Setiawan &; Fitriyah, 2021). There are four domains of science literacy: (1) context (global, national, and personal); (2) knowledge (concepts of science); 3) competence (explanation of scientific facts and issues, design and evaluation of scientific investigations, and interpretation of scientific data and evidence); 4) attitude (interest and concern for scientific issues) (Wulandari &; Sholihin, 2016) (Cholifah &; Novita, 2022).

However, science literacy is still relatively low in Indonesia. The findings of a survey conducted in 2018 by PISA are proof of this where Indonesia is ranked 71st in the world with a score of 396 (OECD, 2019). The selection of learning resources, misconceptions, non-contextual learning, low reading ability, and the atmosphere of the student learning environment are factors that cause low science literacy skills in Indonesia, according to Fuadi et al., (2020), which also states that students' science literacy skills in Indonesia are still very low compared to other countries. According to Huryah et al., (2017) stated that the inability of students to connect and apply science concepts in everyday life is the root cause of low science literacy in Indonesia. According to Mery et al., (2018), students' attitudes towards science and students' interest and enthusiasm for learning also contribute to their low levels of science literacy.

Science literacy skills at Sabilurrosyad Islamic Junior High School are still fairly low due to the limited learning resources that are applicable to make students have low learning motivation and so do not know the meaningfulness of science learning in everyday life. Based on these problems, it is necessary to improve the science literacy skills of students including the use of students worksheet and choosing a contextual learning model.

The use of learning media such as students worksheet can improve students' science literacy skills. Students worksheet is a learning device or media in educating and fostering learning experiences with the aim that the meaning of learning is more easily conveyed and learning targets are actually achieved (Nurrita, 2018). The use of students worksheet allows students to read and understand existing subject matter. Students worksheet contains student activities, practice questions, and material summaries (Arafat et al., 2012). The results of previous studies show that science literacy-based student learning outcomes can be improved through the use of students worksheet (Afsani et al., 2020). So are the results of the study Prasetya et al., (2019) and Azmarita et al., (2019) also concluded that efforts to improve students' science literacy can be through the use of students worksheet. This shows that students' science literacy skills can be improved by using students worksheet in the learning process.

Non-contextual learning is one of the factors causing low science literacy in Indonesia (Fuadi et al., 2020). Therefore, contextual learning or also known as *Contextual Teaching and Learning* (CTL) is needed to assist students in improving their science literacy. A system that involves natural processes at work as well as the identification of concepts and their application is known as contextual learning or CTL learning (Hyun et al., 2020). Contextual learning as proposed by Harwell (1999) in (Suryawati &; Osman, 2018) can encourage students to have a more optimistic attitude when learning science. Students can gain applicable knowledge to overcome problems in their lives through this contextual learning. According to Lotulung et al., (2018) Contextual learning consists of seven components: constructivism (*Constructivism*), find (*Inquiry*), ask (*questioning*), study group (*Learning Community*), modeling (*Modelling*), reflection (*reflection*), and authentic appraisals (*Authentic Assessment*). Results from previous studies show that students' science literacy can be improved by using contextual approaches in the learning process (Puspita, 2019). Likewise, according to research Masfufah & Ellianawati (2020) and Sari et al., (2022) concluded that the improvement of science literacy can be through contextual learning or CTL.

Based on previous research, there is a similarity in the title, namely the use of students worksheet with contextual teaching and learning (CTL) learning models on science literacy skills. Due to the similarity of titles, this study has the advantage of previous research, namely using different materials and research subjects.

The material chosen in this CTL learning integrated students worksheet is class VIII SMP/MTs additive material. The selection of additive material in this LKPD is because it is included in contextual material, where the subject matter is closely related to students' daily lives (Nurfajriani &; Renartika, 2016). Students will find that what they have learned can be applied in their lives and learning outcomes are more meaningful through their experiences when contextual material is used. According to Srikandi (2017), students' science literacy skills are expected to improve as a result of meaningful learning activities.

Thus, in this study students worksheet integrated with CTL (contextual teaching and learning) learning is expected to improve students' science literacy skills. CTL learning integrated students worksheet contain student activities, tasks, and material summaries that are sustainable with students' daily lives through contextual learning. To increase science literacy, students worksheet is also equipped with a science literacy competency component. The purpose of the research is to develop an integrated students worksheet for CTL (*contextual teaching and learning)* learning that is valid, feasible, and effective in increasing students' science literacy in class VIII junior high school additive materials.

METHOD

Types of Research

Research methods *Research and Development* (RnD) was used in this study. According to Astra &; Saputra (2018) (Sugiyono, 2013), research methods *Research and Development* is a method that develops a product and then tests its effectiveness. The development model to be used is the 4D (four-D) development model. *Define, Design, Develop* and *Disseminate* is the four stages of the 4D (four-D) development model (Thiagarajan et al., 1974). Figure 1 illustrates a description representation of the development model to be used.

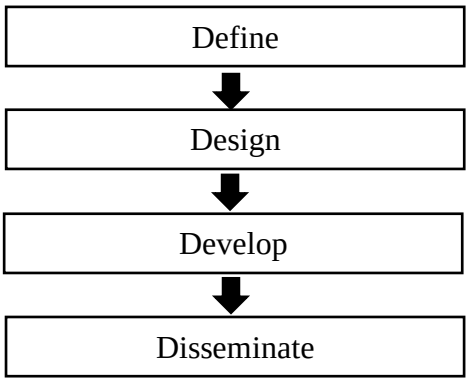

Figure 1. Thiagarajan 4D Development Diagram (Thiagarajan et al., 1974)

Research Setting

The research was conducted from August 2022 to March 2023 at the Department of Science Education, Faculty of Mathematics and Natural Sciences, State University of Malang, and SMP Islam Sabilurrosyad Malang.

Population and Sample

The population in this study was all grade VIII students of SMP Islam Sabilurrosyad Malang. The sampling technique uses purposive sampling. Thus, the sample in this study was 25 students of grade VIII A.

Research Procedure

In short, the research procedure is carried out according to the flow in Figure 1. The purpose of *the define* stage is to analyze the required learning media. The activities carried out are needs analysis, task analysis, concept analysis, and making learning objectives and indicators. The purpose of needs analysis is to collect data about the needs that students have during the learning process. Needs analysis produces qualitative and quantitative data. Conducting interviews with teachers and providing questionnaires of students' needs are techniques used to collect data. In this task analysis, it is carried out to identify learning activities that will be carried out by students in using integrated students worksheet CTL learning to improve science literacy on additive materials. By systematically compiling and detailing concepts related to additive materials, concept analysis aims to determine the main concepts in integrated students worksheet CTL learning.

Next stage *Design* Aims to design initial products that will be used in the implementation of the learning process. At this stage is carried out designing the design and *Layout* students worksheet, compile material concepts and tasks, and make overall product designs. Then the stage *develop* aims to make improvements to students worksheet based on the results of validation tests by experts and product improvements (Thiagarajan et al., 1974). Finally, the stages are carried out *disseminate* which is carried out on a limited trial basis by giving the developed students worksheet to the treatment class to provide an assessment of the product (Sundaygara et al., 2019).

Data, Instruments, Data Collection Techniques, and Data Analysis Techniques

There are several research objects, namely validity, feasibility, and effectiveness. Validity is an assessment process by validators to assess the product so that weaknesses and advantages are obtained before product trials are carried out (Sugiyono, 2013). Qualitative and quantitative

data are the data used. Quantitative data is in the form of numbers or values based on assessment scales, while qualitative data is in the form of comments and suggestions from validators. Material validation sheets and media validation sheets are instruments used in data collection techniques through questionnaires. Quantitative data analysis uses percentage analysis, while qualitative data analysis uses qualitative descriptive analysis.

Eligibility is obtained based on practicality tests on teachers and student readability tests. There was one teacher and 25 students of Sabilurrosyad Islamic Junior High School who took the readability test. Qualitative and quantitative data are the data used. Comments and suggestions are qualitative data, while numerical or value rating scales are quantitative data. Teacher practicality test sheets and student readability test sheets are instruments used in data collection techniques through questionnaires. Quantitative data analysis uses percentage analysis, while qualitative data analysis uses qualitative descriptive analysis.

In addition to assessing the validity of the product, a process of assessing the validity and stability of the question instrument is also carried out through validity tests and reliability tests. Reliability is the process of measuring the regularity or regularity of results *Pretest* and *posttest* student (Suparman, 2020). Qualitative and quantitative data are the data used. Comments and suggestions are qualitative data, while numerical or value rating scales are quantitative data. The instrument test sheet on science literacy questions is an instrument used in data collection techniques through questionnaires. Quantitative data analysis using *IBM SPSS Statistics 16* In validity tests and reliability tests, qualitative data analysis uses qualitative descriptive analysis.

Scale *Likert* and scale *Guttman* is the scale used for quantitative data. Scale *Guttman* used to test the correctness of material concepts, using scores of 1 and 0 to give unequivocal answers between "Yes/True" and "No/Wrong" (Sugiyono, 2013). Material and media expert validation questionnaires, teacher practicality and student readability questionnaires, and science literacy test instrument questionnaires were all filled out using scales *Likert*. Table 1 provides a description of the grading scales *Likert* used in questionnaires.

Table 1. Category Assessment Scale *Likert*
(Suharismi Arikunto, 2010) (Suharsimi Arikunto &; West Java, 2018)

Scale	Category
5	Very Good/Totally Agree (SS)
4	Good/Agree (S)
3	Good enough/Less Agree (KS)
2	Less Good / Disagree (TS)
1	Very Unkind/Strongly Disagree (STS)

To calculate the percentage of answers from quantitative data can use the formula Equation 1 (Riduwan, 2015).

$$P = \frac{\Sigma x}{n} \times 100\% \quad (1)$$

Information:

P = percentage

x = the sum of each validator's scores on each aspect of the assessment

n = Maximum score of assessment aspects

The percentage scale assessment criteria listed in Table 2 will then be used to show the validity and eligibility of students worksheet based on the percentage scale obtained from the questionnaire.

Table 2. Validity and Eligibility Criteria (Mijaya et al., 2021)

Eligibility Percentage	Validity Criteria	Eligibility Criteria
80% - 100%	Highly Valid	Very Worth It
66% - 79%	Valid	Proper
56% - 65%	Quite Valid	Pretty Decent
40% - 55%	Less Valid	Less Decent
0% - 39%	Invalid	Not Worth It

Effectiveness is the process of assessing the effectiveness of a product. Assessment of effectiveness based on results *Pretest* and *posttest* with quantitative data used in the form of numbers or values. Tests that have previously been validated by subject matter experts are used in data collection techniques. Test normality, test *Wilcoxon*, and test *N-Gain* use *IBM SPSS Statistics 16* used for quantitative data analysis. The Normality Test is used to find out if the data obtained is normally distributed (Nasrum, 2018). Test *Wilcoxon* then used to see if there was a significant difference between the data before and after the use of integrated LKPD CTL learning. Test *N-Gain* Used to see if students' science literacy scores have improved. Equation 2 and Table 3 display the calculation formula along with the N-Gain test criteria (Susanto, 2012).

$$N - gain = \frac{S_{post} - S_{pre}}{S_{maks} - S_{pre}} \quad (2)$$

Table 3. Test Criteria *N-Gain* and Effectiveness Rate (Maulana et al., 2020)

Range	Criterion	Effectiveness Rate
$g \geq 0.70$	Tall	Effective
$0.30 \geq g > 0.70$	Keep	Quite Effective
$g < 0.30$	Low	Less Effective

RESULTS AND DISCUSSION

The research product is integrated learning students worksheet *Contextual Teaching and Learning* (CTL) to improve students' science literacy in grade VIII junior high school additive material. The needs analysis of teachers and students at the *Define* stage found that they had utilized students worksheet but had not been equipped with science literacy components during the learning process. In addition, only printed books owned by the government are used as their learning resources. Kimianti &; Prasetyo (2019) said that government books have not fully brought out the competence of skills in the 21st century. The results of the task analysis found that some students were less eager to learn, causing them difficulties such as not focusing on learning. Results of concept analysis according to Nurfajriani &; Renartika (2016) said that additive material is contextual material where the material learned is closely related to students' daily lives. The results of the formulation of learning objectives made have been adjusted to Basic Competencies (KD) 3.6 and 4.6 Grade VIII Junior High School using the 2013 curriculum.

The results obtained at *the design stage* are the layout of the students worksheet, the design of the additive material, learner activities, learning tools, as well as supporting media for the process of understanding concepts and science literacy, quizzes and assessment instructions. Figures 2 and 3 show the results of the students worksheet design.

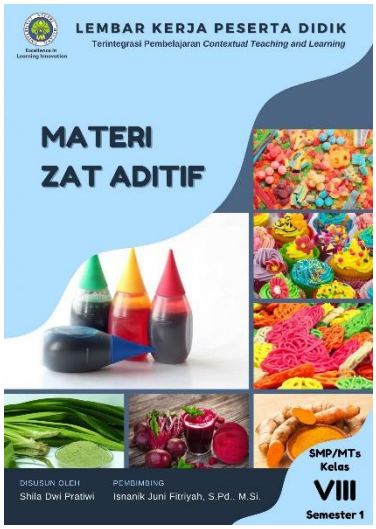

Figure 2. Students worksheet Cover

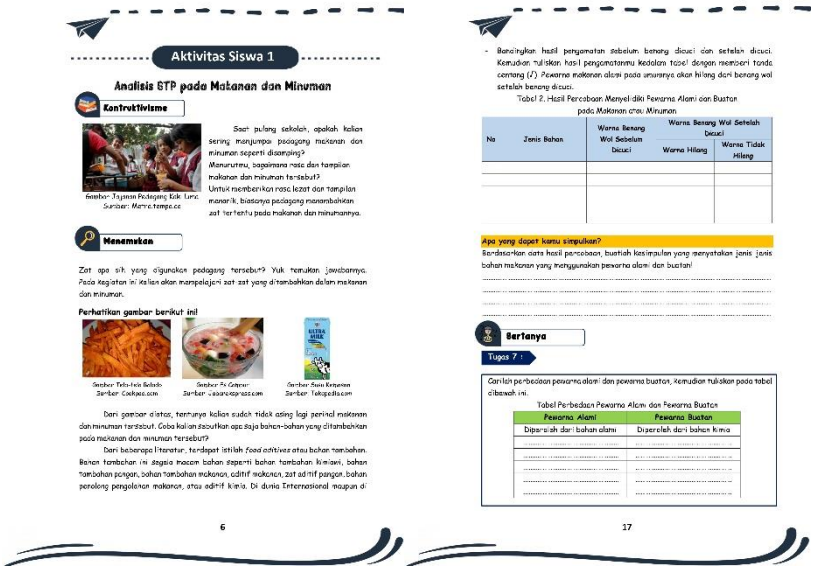

Figure 3. Display of contents in students worksheet

The students worksheet product is designed into 4 student activities with 3 meetings. Students worksheet products are presented by applying learning components *Contextual Teaching and Learning* (CTL) includes constructivism (*Contruktivism*), find (*Inquiry*), ask (*questioning*), study group (*Learning Community*), modeling (*Modelling*), reflection (*reflection*), and authentic appraisals (*Authentic Assessment*) (Lotulung et al., 2018) (Utaminingsing &; Shufa, 2019). The "constructivism" component contains the activity of developing (new) knowledge on its own using what students already know through experience in everyday life (Lotulung et al., 2018). The "discovering" component contains the activity of finding something or knowledge through observation, analysis, investigation to their own experience (Hasibuan, 2014). The "questioning" component to arouse students' interest by finding relevant information and knowledge. The "study group" component is a group learning activity that encourages students to collaborate. Then the "modeling" component is an activity to give examples (Lotulung et al., 2018). The "reflection" component aims to review material that has been understood and new knowledge gained. And the "authentic assessment" component contains quizzes that learners can use as assessments in the learning process (Hasibuan, 2014). Students worksheet is also equipped with a component of science literacy competency, namely explaining scientific phenomena, designing and evaluating scientific investigations, and interpreting scientific data and evidence (Setiawan et al., 2017) (Cholifah &; Novita, 2022).

Students Worksheet Validation Test

The students worksheet validation test integrated *with contextual teaching and learning* (CTL) learning was carried out by two validators, namely material expert validators and media expert validators. Both validators are science lecturers. The results of validation by validators are used to determine the validity of the integrated LKPD of CTL learning and become material for improvement for product trials. Table 4 displays the results of material expert validation tests on students worksheet.

Table 4. Students worksheet Material Validation Test Results

No	Assessed aspects	Percentage (%)
1.	Eligibility of contents	94,3%
2.	Language feasibility	100%
3.	Compatibility with CTL (*contextual teaching and learning*) learning	97,1%
4.	Conformity with science literacy competence	93,3%
Average		**96,2%**
Criterion		**Highly Valid**

Based on Table 4, the material validation results obtained an average percentage of 96.2% including very valid criteria. The percentage of 94.3% which includes very valid criteria is included in the aspect of content eligibility. This shows that Basic Competencies (KD) 3.6 and 4.6 of Junior High School Class VIII have been fulfilled with indicators, learning objectives, and material concepts in students worksheet. There are suggestions for improvement from validators regarding the presentation of concept maps that are still lacking. According to Rezeki et al (2015) A concept map describes the structure of a concept by associating one concept with another and connecting with a connecting word.

At The language eligibility aspect obtained a percentage of 100% including very valid criteria. This shows that the sentences used in students worksheet are easy to understand, do not double meaning, reflect students' intellectual growth, and adhere to EYD (Enhanced Spelling). On the aspect of conformity with learning *Contextual Teaching and Learning* Getting a percentage of 97.1% including very valid criteria. Validators suggest improvements to the "study group" component that the redactions used need to be improved. In the aspect of conformity with science literacy competence, a percentage of 93.3% was obtained, including very valid criteria. Validators suggest improvements to the Interpreting Scientific Data & Evidence activity to create one activity, namely creating graphs or with bar charts from the data provided.

Table 5. Media Validation Test Results

No	Assessed aspects	Percentage (%)
1.	Cover Section	91,4%
2.	Students Worksheet Content Section	96%
Average		**93,7%**
Criterion		**Highly Valid**

Table 5 displays the results of media expert validation tests on students worksheet. Based on Table 5, the results of validation by media experts obtained a percentage of 93.7% including very valid criteria. In the aspect of the cover of students worksheet, a percentage of 91.4% was obtained, including very valid criteria. There are suggestions for improvement from validators regarding design and *Layout* on the cover. For the font type in "Integrated Learning Contextual Teaching and Learning" replaced with another font type that is more interesting and layout

Layout The title is equated with other spaces. The cover of students worksheet has the purpose of displaying the contents contained in students worksheet (Utami &; Dafit, 2021). In the aspect of the content section, students worksheet gets a percentage of 96%, including very valid criteria. Validators suggest improvements that are on *QR Code* Need to add the source.

Students Worksheet Feasibility Test

Feasibility tests are obtained based on practical tests on teachers and student readability tests. The feasibility test was conducted at SMP Islam Sabilurrosyad Malang. The practicality test given by the teacher and the readability test given by the students determine the feasibility of students worksheet. One science teacher conducted a practicality test and 25 grade VIII students took the readability test. Table 6 displays the results of the teacher practicality test assessment.

Table 6. Teacher Practicality Test Results

No	Assessed aspects	Percentage (%)
1.	Material	80%
2.	*Contextual Teaching and Learning*	73,3%
Average		**76,65%**
Criterion		**Proper**

Based on Table 6, the practicality test conducted by science teachers of SMP Islam Sabilurrosyad Malang obtained an average percentage of 76.65% including eligibility criteria. This shows that the integrated students worksheet of CTL learning meets the eligibility criteria by its users. There are suggestions and inputs from science teachers that students worksheet is even more interesting if activities are made to identify their favorite snacks, such as whether their snacks are healthy? Judging from the composition and given experimental activities"*Challenge*" make healthy snacks that avoid BTP or Food Additives harmful to the body.

Table 7. Student Readability Test Results

No	Assessed aspects	Percentage (%)
1.	Students Worksheet Interest	85,3%
2.	Material	87,4%
3.	Contextual Teaching and Learning	83,2%
4.	Science literacy	84,4%
Average		**85,1%**
Criterion		**Very Worth It**

Table 7 displays the results of the student readability test. Based on Table 7, CTL learning integrated students worksheet is very feasible to be used in learning because it obtained an average percentage of 85.1% from student readability tests. This proves that the integrated students worksheet of CTL learning meets the eligibility criteria by its users. Comments from students also indicate that students worksheet is good and interesting.

Based on Table 6 and Table 7 shows that integrated students worksheet CTL learning is feasible to use in learning. This is according to research Sugiyanto et al., (2018) that contextual-based students worksheet is good for use in learning.

Validity Test and Reliability Test of Question Instruments

Before the empirical test was carried out, a validation test of question instruments with indicators of science literacy competence was carried out by expert validators. Table 8 displays the results of expert validation tests on question instruments.

Table 8. Question Instrument Validation Results

Question number	Percentage (%) of Validation	Category
1	96%	Very Worth It
2	80%	Proper
3	80%	Proper
4	88%	Very Worth It
5	88%	Very Worth It
6	100%	Very Worth It
7	100%	Very Worth It
8	100%	Very Worth It
9	100%	Very Worth It
10	96%	Very Worth It
Total	**928%**	
Average	**92,8%**	**Very Worth It**

Then the question items are tested for validity and reliability. A total of 25 students worked on the instrument on science literacy of additive materials. Question validity aims to see the ability of the test instrument to meet measurement objectives in accordance with its function. Decision making according to Al Hakim et al., (2021) If R counts > R tables, the question items are declared valid and if R counts < R tables, the question items are declared invalid. Table 9 and Table 10 display the validity of the item on the material science literacy problem of additives.

Table 9. Pretest Question Validity Results

Question Point	r calculate	r table	Criterion
Question 1	0,226	0,396	Invalid
Question 2	0,148	0,396	Invalid
Question 3	0,514	0,396	Valid
Question 4	0,463	0,396	Valid
Question 5	0,339	0,396	Invalid
Question 6	0,562	0,396	Valid
Question 7	0,060	0,396	Invalid
Question 8	0,387	0,396	Invalid
Question 9	0,193	0,396	Invalid
Question 10	0,524	0,396	Valid

Table 10. Posttest Question Validity Results

Question Point	r calculates	r table	Criterion
Question 1	0,014	0,396	Invalid
Question 2	0,301	0,396	Invalid
Question 3	0,418	0,396	Valid
Question 4	0,014	0,396	Invalid
Question 5	0,543	0,396	Valid
Question 6	-0,110	0,396	Invalid
Question 7	0,621	0,396	Valid
Question 8	0,275	0,396	Invalid
Question 9	0,201	0,396	Invalid
Question 10	0,492	0,396	Valid

Then valid questions are tested for reliability. Reliability test results on the questions *Pretest* has value *Cronbach's Alpha* amounted to 0.507, while on the question *posttest* amounted to 0.405. So decision making according to Guilford (1956) in (Suparman, 2020) The test results both showed a reliability coefficient including medium criteria. Table 11 shows the results of the reliability test on the question pretest and posttest.

Table 11. Pretest and Posttest Question Reliability Results

Group	Cronbach's Alpha *Value*	Criterion
Pretest	0,507	Keep
Posttest	0,405	Keep

Students Worksheet Effectiveness Test

Test effectiveness of integrated students worksheet CTL learning based on initial test results (*Pretest*) and end (*posttest*) students using expert-validated science literacy tests. Science literacy test instruments include aspects of science knowledge and competence. The aspect of knowledge of additive materials includes understanding the concept of additives, the difference between natural and artificial dyes, and the impact of using additives on health. Explaining scientific phenomena, designing, and evaluating scientific investigations, and interpreting scientific data and evidence are aspects of scientific literacy competence.

Pretest carried out before entering learning, while *posttest* given after learning using integrated students worksheet CTL learning. Researchers provide 10 multiple-choice questions with a question model that includes aspects of knowledge and competence in science literacy. After the values are collected, a test is performed *Shapiro-Wilk* to find out if the data is from the results *Pretest* and *posttest* normally distributed. Result data *Pretest* Has a GIS value of 0.00 based on the test *Shapiro-Wilk*, while the result sig value *posttest* obtained by 0.029. Both show a sig value of < 0.05. Decision making based on Oktaviani &; Notobroto (2014) If the GIS value < 0.05, the data is not normally distributed. Table 12 shows normality test results *Pretest* and *posttest.*

Table 12. *Pretest* and *Posttest Normality Test Results*

Group	Sig.	Criterion
Pretest	0,000	Abnormal
Posttest	0,029	Abnormal

Based on Table 13, a non-parametric test, namely the *Wilcoxon* test, is used to determine whether there is a significant difference between before and after the use of integrated students worksheet CTL learning because the data produced is not normally distributed. With the preparation of hypotheses in this study as follows:

H_0 : There is no difference from before and after the use of integrated students worksheet CTL learning in improving students' science literacy skills

H_1 : There are differences from before and after the use of integrated students worksheet CTL learning in improving students' science literacy skills (Rudianto et al., 2020)

Table 13. Wilcoxon Test Results

Group	Average	Sig.	Criterion
Pretest	60,4	0,00	Significantly different
Posttest	80,8		

Decision making based on Asymp results. Sig. (2-tailed) from the data in Table 13 of 0.00 < 0.05, it was rejected and accepted, which means that there are differences from before and after the use of integrated students worksheet CTL learning in improving the science literacy ability of grade VIII students on additive materials. H_0H_1

In addition, the *N-Gain test* is used to ensure an increase in students' science literacy scores. Table 14 displays the average score of pretest *and posttest* results, *standard deviation, and* N-Gain score.

Table 14. Students' Science Literacy Pretest, Postest, and N-Gain Average Scores

	Pretest *Scores*	Posttest *Scores*	*N-Gain*
Average rating	60,4	80,8	0,54
Std. Deviation	13,69	11,52	
Lowest Value	20	50	
Top Rated	80	100	
Criterion			Keep

Based on Table 14, students' science literacy skills showed an increase from the average score pretest and posttest obtained are 60.4 and 80.8. N-Gain analysis shows medium criteria with a score of 0.54. This shows that the development of integrated students worksheet CTL learning is quite effectively used in improving students' science literacy skills as seen in Table 3. This is in line with the research conducted Angjelina &; Asrizal (2019) concluded that the use of students worksheet IPA containing scientific literacy in contextual learning models is effective in Integrated Science learning. Similar research also shows that students' science literacy skills can be improved through CTL learning (*Contextual Teaching and Learning*) (Srikandi, 2017).

Explaining scientific phenomena, designing, and evaluating scientific investigations, and interpreting scientific data and evidence are aspects of scientific literacy competence. Table 15 displays a recapitulation of the average pretest *and* posttest scores, *as well as* the N-Gain *of students' science literacy ability on aspects of science literacy competence.*

Table 15. *Pretest, Posttest,* and *N-Gain* Scores of Science Literacy Competency Aspects

No	Indicators	Question Point	Pretest *Scores*	Posttest *Scores*	*N-Gain*	Criterion
1.	Explaining scientific phenomena	1, 2, 4	81,33	90,66	0,50	Keep
2.	Design and evaluate scientific investigations	7, 8, 9, 10	35	64	0,45	Keep
3.	Interpreting scientific data and evidence	3, 5, 6	68	89,33	0,67	Keep

Based on Table 15, it was found that in all aspects of students' science literacy competence increased after using integrated students worksheet CTL learning. The competency aspect of the indicator obtaining the highest N-Gain value is interpreting scientific data and evidence of 0.67 including moderate criteria. Then in explaining scientific phenomena obtained an N-Gain value of 0.50 including medium criteria and the lowest increase was to design and evaluate scientific investigations obtaining an N-Gain value of 0.45 including medium criteria.

A person's response to a phenomenon or problem that affects his life or environment is an important aspect of the science literacy attitude (Srikandi, 2017). Aspects of science attitudes include interest in science topics, concern for the environment and resources, and support for scientific approaches. There are 5 attitude scale test questions that are tested at the end of learning. Table 16 displays the results of achievement of aspects of students' science literacy attitudes for each indicator.

Table 16. Results of Achievement of Aspects of Science Literacy Attitudes

No	Indicators	Question Point	Value	Qualification
1.	Interest in science issues	1, 2	72	B
2.	Care for the environment and natural resources	3, 4	87,25	SB
3.	Supporting a scientific approach	5	34	SK

Description: SB=Very Good, B=Good, C=Enough, K=Less, SK=Very Less

Based on Table 16, concern for the environment and resources has a high achievement value of 87.25 including very good criteria. The implementation of integrated students worksheet CTL learning can stimulate students' curiosity in providing solutions to existing problems, this is expected to arouse students' interest in science topics and problems so that they can use the science concepts they learn to care about themselves and their environment.

Furthermore, in the aspect of interest in science issues, a score of 72 was obtained, including good criteria. Students' interest in the scientific issues raised influences the learning

process. In the aspect of supporting the scientific approach, a score of 34 was obtained, including very poor criteria. This shows that the implementation of integrated students worksheet CTL learning has not been possible for students in investigation activities such as collecting, sorting, and presenting data that is easy to understand because of investigation. The causes of low student attitudes in supporting scientific approaches include that students are not used to using scientific approaches in their daily lives. Then in the learning process there are students who lag behind in understanding the material, this is in line with opinions Wahyuni (2016) that one of the disadvantages of CTL learning is that it takes a long time during the contextual learning process.

The final stage in the development of integrated students worksheet CTL learning is the *disseminate* stage. The dissemination of integrated students worksheet CTL learning was carried out on a small scale including the introduction of students worksheet and limited trials in the treatment class. The introduction of integrated students worksheet CTL learning to the science teacher of SMP Islam Sabilurrosyad is used as a learning media for class VIII on the material of additives while a limited trial is conducted to provide an assessment of the product.

This shows that the integrated students worksheet CTL learning is easily understood by students in the learning process, both in terms of material presentation and evaluation questions that can encourage students to practice science literacy. Thus, it can be concluded that the integrated students worksheet CTL learning is very valid, very feasible, and quite effective to be used as teaching materials for science subjects on additive materials in improving students' science literacy.

CONCLUSIONS AND ADVICE

Conclusion

Based on the results of research and development that has been carried out, it can be concluded that the integrated students worksheet of CTL (*contextual teaching and learning*) learning is stated in very valid criteria based on the results of validation by material experts and validation by media experts of 96.2% and 93.7% respectively. The results of the practicality test by the teacher were included in the feasible criteria with a percentage of 76.65% and the student readability test obtained a percentage of 85.1% including the criteria very feasible to be used by its users. Based on the results *of the Wilcoxon* test analysis, there is a significant difference between before and after the use of integrated students worksheet CTL (*contextual teaching and* learning) learning in increasing students' science literacy. The N-Gain of 0.54 was at$0.30 \geq g > 0.70$, indicating that integrated students worksheet of CTL (*contextual teaching and learning) learning is* included in the criteria that is quite effectively used to improve students' science literacy.

Suggestion

In the application of contextual learning, it is better to pay attention to the time during the learning process so that all syntax is fulfilled so that it has an impact on learning outcomes and increases students' science literacy skills. Then for further researchers, it is necessary to develop other wider learning integrated students worksheet in order to improve students' science literacy.

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