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Teaching Materials of Cluster Blended-Based Learning on Reduction-Oxidation Reactions to Improve Students' Scientific Literacy

Arisy Erwin Junaidah[1,*], Erman[2], Rahardjo[3]
[1,2] Universitas Negeri Surabaya, Surabaya, Indonesia

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ABSTRACT

This study aims to describe the feasibility of teaching material (syllabus, Lesson Plans, Independent Learning Activity Unit and pretest-posttest question grid) of cluster-blended learning based on reduction oxidation reactions for grade X science high school chemistry learning. Validity, practicality and effectiveness were used to describe the teaching material's feasibility. Data analysis of validity, practicality, and effectiveness results showed that. The teaching materials developed are eligible with a percentage of agreement more than 75%. Therefore, cluster-blended learning teaching materials are declared to meet the validity, practical, effectiveness criteria in high category. As implication, it is feasible to use as teaching materials of reduction oxidation reactions to improve students' scientific literacy.

INTRODUCTION

Education is one of the most important fields in human life. The quality of education, especially science education in Indonesia is still low when compared to other developing countries. According to Prabowo (2018), the quality of education especially science education in Indonesia is still low when compared to other developing countries, this is because students are not trained to think in understanding natural phenomena or events with scientific methods like scientists (Rusilowati, 2016). This is evidenced by the results of the 2018 International Student Assessment (PISA), Indonesia is ranked 70 out of 78 countries with an average score of 371 (OECD, 2019; Narut & Kanisius, 2019). Based on research conducted by Fuadi et al. (2020), there are several factors causing the low scientific literacy skills of Indonesian students proposed by researchers related to the results of the Indonesian PISA. Among them a) Selection of textbooks, b) Misconceptions, c) Learning is not contextual, d) Low reading ability, and e) The learning environment and climate are not conducive.

In OECD (2019), the ability to engage with scientific issues and ideas is called scientific literacy. Through knowledge of scientific literacy, citizens can learn to make decisions in everyday life based on an assessment of information and scientific concepts. Scientific literacy may have two different meanings. First, the description of the basic skills of reading, writing, and communicating scientifically. Second, matters relating to individual knowledge, learning, and science education (Wright et al., 2015). Scientific literacy was assessed through a Program for PISA study from the Organization for Economic Co-operation and Development (OECD). In OECD 2019, according to the PISA 2018 Science Framework, the definition of scientific literacy includes three interrelated competencies, namely: 1) Explaining phenomena scientifically; 2) Evaluating and designing scientificinquiries; 3) Interpreting data and evidence scientifically. The low level of scientific literacy in Indonesia urges immediate improvement and renewal in order to enhance the quality of science learning. According to Erman (2019), a person does not have scientific literacy due to lack of adequate vocabulary, concepts, and science, which in turn leads to the inability to identify and respond to science-related problems logically. Scientific literacy cannot be achieved if students still have difficulty understanding the material (Erman, 2021). Learning that is carried out using a model when learning activities take place is a way that can be done and the Blended Learning learning model can be used to overcome this.

Blended learning is a combination of face-to-face and online delivery methods, in order to complement each other, which is expected to have a significant relationship between blended learning, student learning experiences, and final achievement (Joana, 2013; Vo et al., 2018). Based on the results of Utami's (2018) research, it was revealed that the blended learning model can contribute more to improving student achievement than the traditional learning model. In Widiara's research (2018), the effectiveness of blended learning is higher when compared to the face-to-face system (conventional learning). Teaching can be achieved effectively by combining the advantages of an online environment with face-to-face interactions in a classroom that has more visual elements (Yapici, 2013). According to Nisrina, et al. (2020), student Worksheet developed based on blended learning in science learning has an effect on increasing students' scientific literacy. In addition, research by Lestari et al. (2020), shows an increase in scientific literacy skills when applying the blended learning model with an average of good categories. Wahyuni et al.'s research (2019), proves that Blended Learning can increase students' motivation to learn up to 88.47% and can improve students' critical thinking skills.

The heterogeneity of different students' initial levels is a challenge for teachers, heterogeneous students' prior knowledge comes from different educational systems and very diverse interests and motivations are related in subjects (Schettini et al., 2020). Before starting the learning, students will be classified into two clusters, namely cluster A and cluster B based on the students' scientific literacy competence which was tested during the pretest. According to Wiliyanto (2015), superior students or students in the upper cluster are children who behave creatively because they have extraordinary cognitive abilities. In Sulistyaningsih (2017), it is stated that the grouping of students according to their abilities aims to provide educational services that are in accordance with what is needed by students. Each student will get a different Independent Learning Activity Unit (ILAU) according to the cluster. When in the classroom, learning is carried out simultaneously and cluster A and cluster B students will mingle, this aims to create a peer tutoring situation in the classroom but still under the supervision of the teacher.

This kind of arrangement makes the class dynamic and more flexible in providing services according to students' abilities. This is also so that teachers can still provide evaluations and feedback quickly that can be used to inform further revisions. If from the evaluation results it is found that students have not been able to find the concept correctly, then students will be given one more context with the same cognitive level and working stage so that students can find redox concepts independently and when face-to-face learning students can present their learning results and the teacher can confirm the concepts that have been obtained by students.

This blended learning cluster-based learning tool is structured to design activities that will be carried out during the learning process, so that learning can really arouse students' independence to think scientifically according to the three basic stages in the blended learning model that refers to ICT-based learning, as proposed by Ramsay (2001), namely: (1) seeking of information, (2) acquisition of information, and (3) synthesizing of knowledge. This research was conducted on students of class X Science in Kediri 2nd Islamic Senior High School. The teaching materials developed were validated by three expert validators and the class activities were observed by three observers during the research. Thus, through learning using cluster-blended learning teaching materials that were developed, it is hoped that the students' scientific literacy skills on redox material are expected to increase.

RESEARCH METHOD

General Background

This research is a development research of teaching materials with a blended learning model to improve students' scientific literacy. The model for developing teaching materials that will be used by researchers is the "Four-D Models" developed by Thiagarajan et al. (1974), which consists of 4 stages, (1) Define (define the learning requirements, the determination of the learning requirements begins with an analysis of the limits of the material developed. This stage consists of several steps, namely: needs analysis (blended learning model), student analysis, concept analysis (Reduction-Oxidation Reactions), task analysis (ILAU), and formulation of learning objectives), (2) Design (designing teaching materials. The design stage consists of media selection, format selection, and test preparation), (3) Develop (produce a product that has been revised based on the assessment and input of the validator and data obtained from the development test) and (4) Disseminate (limited deployment which is the stage of using teaching materials that have been developed on a wider scale, namely after completion of trial 1, the teaching materials will be revised and after that it will be re-tested through trial 2 in other classes in the school).

Participants

The subjects in this study were 72 students from two class of class X Science in Kediri 2nd Islamic Senior High School. Students receive reaction redox material and with heterogeneous levels of academic ability.

Instrument and Procedures

Teaching materials developed by the syllabus, Lesson Plans, ILAU and pretest-posttest question grid. The research begins with the define stage by analyzing potential problems such as examining student characteristics, formulating mathematical concepts and ILAU procurement, then the design stage by compiling and designing teaching materials such as media selection, format selection, and preparation of tests, develop stage with expert validation, and disseminate stage by conducting trials. The research procedure can be written as in the flowchart in Figure 1.

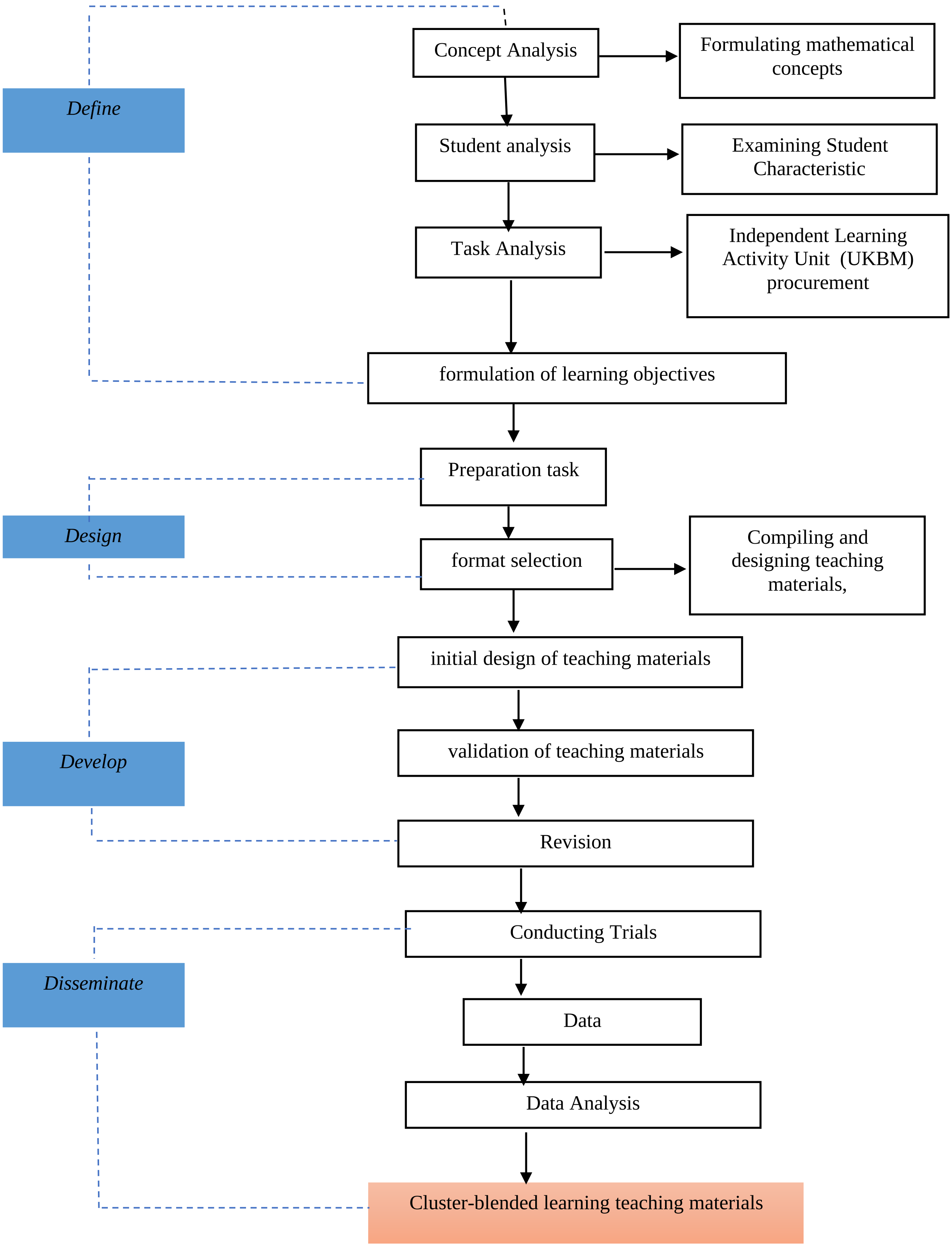

Figure 1. Research procedure flowchart.

Data Analysis

The assessment of the validity of the blended learning cluster teaching materials was carried out by three validators, consisting of two lecturers from Unesa and one chemistry teacher from Islamic Senior High School 2 Kediri. The validity assessment assesses the eligibility criteria for cluster-blended learning teaching materials based on the validity criteria in terms of the relevance between the substances in the teaching materials in accordance with the statements contained in the validation sheet based on three criteria, namely content, language, and serving. Each criterion has several indicators. The score given for each validity assessment is determined by the scoring mode (Mo) for each assessment criterion. Cluster-blended learning teaching materials developed are declared feasible if they get mode 3. The results of the assessment are calculated using the mode using the Validity Rating Scale and then a descriptive analysis is carried out, as presented in Table 1.

Table 1. Validity rating scale.

Evaluation	Score
Very Valid	4
Valid	3
Not valid enough	2
Invalid	1

(Adaptation: Riduwan, 2016)

The score given for each validity assessment is determined by the scoring mode (Mo) for each assessment criterion. developed cluster-blended learning teaching materials. Then the reliability is calculated using the following formula:

$$Percentage\ of\ Agreement\ (R) = \left[1 - \frac{A-B}{A+B}\right] \times 100\%$$

Information:
R = Coefficient of reliability
A = The result of the assessment by the observer who gave a high score
B = The result of the assessment by the observer who gave the low score

An instrument for assessing teaching materials is said to be reliable if the percentage of agreement obtained is 75% (Borich, 1994). Based on the criteria in Table 1, the teaching materials developed are said to be valid if they get a score of 3 or the minimum category is valid. Assessment of the practicality of cluster-blended learning teaching materials using the lesson plan implementation sheet. Assessment of the effectiveness of cluster-blended learning teaching materials using analysis of students' scientific literacy skills based on pretest-posttest scores. The lesson plans implementation instrument sheet contains the syntax during the learning process carried out by the teacher with the score criteria as in Table 2.

Table 2. Score criteria.

Score	Criteria
4	Very Good
3	Good
2	Not Good Enough

Score	Criteria
1	Not Good
0	Not Done

(Adaptation: Riduwan, 2016)

The student questionnaire instrument sheet contains statements regarding the practicality of cluster-blended learning teaching materials with Yes and No answer choices using a check mark (√). The score given for each effectiveness assessment is determined by the scoring mode (Mo) for each assessment criterion. The cluster-blended learning teaching materials developed are declared effective if the data analysis of students' scientific literacy abilities scores 75 and differences in students' scientific literacy abilities at the pretest-posttest are analyzed using the n-gain score with the following formula:

$$(g) = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}}$$

Information:

(g) = gain value
S_{post} = posttest score
S_{pre} = pretest score
S_{max} = maximum value

The data from the n-gain calculation is converted using the criteria presented in Table 3.

Table 3. N-Gain score citeria.

N-Gain Score	Category
0,7 ≤ n-gain	High
0,3 ≤ n-gain ≤ 0,7	Medium
n-gain ≤ 0,3	Low

RESULTS AND DISCUSSION

The results obtained in this study are data on the validity, practicality, and effectiveness of cluster-blended learning teaching materials.

Define Stage Results

The analysis phase aims to determine and define the learning conditions. The analysis is carried out, namely, (1) needs analysis is carried out by searching for information or literature studies regarding the needs needed by teachers and students in learning; (2) student analysis, the researcher examines the characteristics of students which include abilities, background knowledge, and levels of cognitive development of students and it is found that students of Islamic Senior High School 2 Kediri City X Science class are on average 16-17 years old where that age is a formal operational stage so that students can complete better and more complex problems; (3) concept analysis, researchers formulate relevant redox concepts based on needs analysis; (4) task analysis, the researcher compiles a procedural set to determine the content in the learning unit by compiling ILAU; (5) the analysis of the formulation of learning objectives, researchers develop learning objectives based on learning indicators related to redox material in lesson plans.

Design Stage Results

This stage aims to design teaching materials. The design phase consists of: (1) media selection, learning media selected to develop teaching materials, namely using cluster-blended learning-based teaching materials to improve scientific literacy skills; (2) the selection of format, the format of teaching materials developed is adjusted to the format that has been made by the Ministry of National Education based on the 2013 Curriculum and the National Education Standards Agency. The teaching materials developed include syllabus, lesson plans, ILAU, and pretest-posttest grid; (3) preparation of the test. This test was selected based on the formulation of indicators, in this research the test developed includes test items to measure scientific literacy ability in the form of pretest-posttest.

Develop Stage Results

Cluster-blended learning teaching materials will be validated by experts, namely two lecturers from the State University of Surabaya and one teacher at Islamic Senior High School 2 Kediri City. Validation was carried out to determine the validity of the developed cluster-blended learning teaching materials. Validity includes three criteria, namely content feasibility, language feasibility, and presentation feasibility. The results of the validation on cluster- blended learning teaching materials (Syllabus) are presented in Table 4.

Tabel 4. Validation results on cluster-blended learning teaching materials (syllabus).

No	Statement	Modus score	Percentage of Agreement (%)
Content			
1	The conformity of the Syllabus with the 2013curriculum	4	100.00
2	Order in the syllabus	4	100.00
3	Formulation of core competencies in the syllabus	4	100.00
4	Formulation of basic competencies in the syllabus	4	100.00
5	Formulation of learning activities in the syllabus	4	100.00
6	Formulation of assessment instruments on the syllabus	4	90.47
7	Formulation of time allocation on the syllabus	4	100.00
8	Formulation of learning resources in the syllabus	4	100.00
Language			
9	Use of good and correct language	4	90.47
10	Use of appropriate terms and easy to understand	4	90.47
Serving			
11	Syllabus Format	4	100.00
12	Syllabus Quality	4	90.47
	Average	**4**	**96.82**

The mode result of the overall score given by the validator is 4 so it is included in the very valid category based on table 1. In accordance with Borich (1994), the syllabus can be said to be reliable if the Percentage of Agreement (R) is 75.00% and from the results of the validator's assessment of the reliability of the syllabus validation the average value is ≥75.00% in each indicator. These results indicate that the syllabus is valid to use. It can also be shown the results of the validation of the syllabus which can be seen through the bar chart in Figure 2.

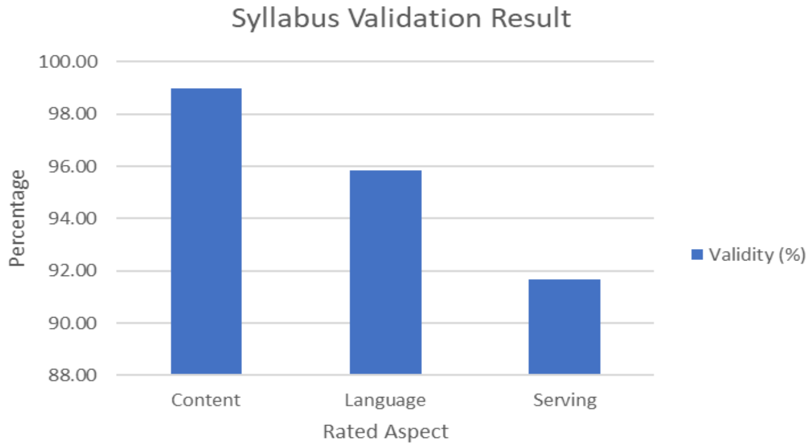

Figure 2. Syllabus validation result.

The content feasibility value is obtained from the average percentage of agreement in the content indicator so that the content feasibility value in the syllabus is obtained is 98.96%. Likewise, the language feasibility value and serving feasibility value are 95.83% and 91.67%, respectively. The assessment of the other six cluster-blended learning teaching materials was carried out using the same method and then analyzed. The second cluster-blended learning teaching material is lesson plans. The mode result of the overall score given by the validator is 4 so it is included in the very valid category based on table 3.1. In accordance with Borich (1994), lesson plans can be said to be reliable if the Percentage of Agreement (R) is 75.00% and from the results of the validator's assessment of the reliability of lesson plans validation the average value is ≥75.00% in each indicator. These results indicate that the lesson plan is valid to use. The results of the lesson plans validation are taken from the average number of percentage scores obtained for each indicator. Feasibility of content gets a percentage of 93.52%, feasibility of language 91.67%, and feasibility of serving 94.44%.

The third cluster-blended learning teaching material is ILAU, the mode result of the overall score given by the validator is 4 so it is included in the very valid category based on table 3. In accordance with Borich (1994), ILAU can be said to be reliable if the Percentage of Agreement (R) is 75.00% and from the results of the validator's assessment of the reliability of ILAU validation the average value is ≥75.00% in each indicator. These results indicate that ILAU is valid to be used. The results of the ILAU validation are taken from the average number of percentage scores obtained for each indicator. Feasibility of content gets a percentage of 95.83%, feasibility of language 96.67%, and feasibility of serving 100.00%.

The fourth cluster-blended learning teaching material is the pretest-posttest question grid. The mode result of the overall score given by the validator is 4 so it is included in the very valid category based on table 3. In accordance with Borich (1994), the pretest-posttest grid can be said to be reliable if the Percentage of Agreement (R) is 75.00% and from the results of the validator's assessment of the reliability of the validation grid of the pretest-posttest questions the average value is ≥75.00% in each indicator. These results indicate that the pretest-posttest lattice is valid to use. The results of the validation of the pretest-posttest question grid are taken from the average number of percentage scores obtained for each indicator. Feasibility of content gets a percentage of 83.33%, language eligibility 95.83%, and serving feasibility 100.00%.

Disseminate Stage Results

The Disseminate stage is a limited distribution which is the stage of using the teaching materials that have been developed. The quality assessment is based on the practicality and effectiveness of the developed cluster-blended learning teaching materials, the practicality assessment in terms of the assessment of 3 teachers at Islamic Senior High School 2 Kediri City using the lesson plan implementation sheet and student assessments using a response questionnaire. The assessment of the effectiveness of cluster-blended learning teaching materials in terms of students' scientific literacy abilities was tested on the pretest-posttest.

Practicality

Cluster-blended learning teaching materials can be declared practical in terms of the teacher's assessment on the lesson plan implementation sheet and the student assessment contained in the response questionnaire. Cluster-blended learning teaching materials are said to be practical if they get a mode score of 3. The assessment of the implementation of the lesson plans can be described in Table 5.

Table 5. Results of the implementation of the first meeting lesson plans.

No	Learning Activities	Modus score	Percentage of Agreement (%)
1	The teacher distributes the ILAU for the first meeting through the Google Classroom on the day before the start of learning.	4	100.00
2	Students download the ILAU for the first meeting for the first meeting which has been shared by the teacher via google classroom on the day before the start of learning.	4	100.00
A. Opening Activity (Phase 1 *Seeking of Information:* 25 minutes)			
3	Teacher greets	4	100.00
4	Students and teachers pray together	4	100.00
5	Teacher checks student attendance	4	100.00
6	The teacher relates the material in the previous chapter	4	100.00
7	The teacher gives a video of rusting iron as a motivation for students to learn redox reactions.	4	100.00
8	The teacher shows a video about oxidized apples. https://www.youtube.com/watch?v=3R8jn62dG8Q	4	90.47
9	The teacher gives questions to students related tothe video "Why do peeled apples turn brown?"	4	90.47

No	Learning Activities	Modus score	Percentage of Agreement (%)
	"Why do apples stay fresh when soaked in boilingwater or in salt water?"		
10	Students seek information from various sources about what is needed to answer questions about thevideo about oxidized apples (collect data)	4	100.00
B. Core Activities (Phase 2 *Acquisition of Information*: 50 minutes)			
1	The teacher guides students to do ILAU	4	90.47
2	The teacher gives input when students present the results of their work regarding oxidized apples	4	90.47
3	The teacher directs students to find and read information about oxidation numbers and their changes from various sources, both offline and online	4	100.00
4	The teacher presents the experimental video "Manganese Traffic Light", students can define changes in oxidation numbers that occur in the experiment.	4	100.00
5	The teacher directs students to find and read information about corrosion from various sources	4	100.00
C. Closing Activities (Phase 3 *Synthesizing of Knowledge*: 15 minutes)			
1	The teacher guides students to make resumes from the material that has been discussed, namely aboutbiloks.	4	100.00
2	The teacher provides input when students present a resume about the material that has been discussed	4	100.00
3	The teacher directs students who want to respond and ask questions about the material discussed	4	100.00
4	The teacher gives students an assignment about the material that has been discussed	4	100.00
5	The teacher conveys the material to be studied at the next meeting	4	100.00
6	The teacher closes the learning activity	4	100.00
7	The teacher conducts a coaching session with students through group chat until the second meeting	4	100.00
	Average	**4**	**97.82**

The result of the mode of the overall score given by the observer is 4 so that it is included in the very good category based on table 3. In accordance with Borich (1994), lesson plans can be said to be reliable if the Percentage of Agreement (R) is 75.00% and from the results of the observer's assessment of the reliability of the implementation of the lesson plans in the first meeting, most of the indicators have a score of 97.82%. These results indicate that the lesson plans that have been developed are practical to use.

The lesson plans assessment for the second and third meetings was carried out using the same method and then analyzed. The results of the assessment of the implementation of the lesson plans in the second meeting showed that the mode result from the overall score given by the observer was 4 so that it was included in the very good category based on table 3. In accordance with Borich (1994), lesson plans can be said to be reliable if the Percentage of Agreement (R) is 75.00% and from the results of the observer's assessment of the reliability of the implementation of the lesson plans, most of the indicators have a score of 99.09%. These results indicate that the second meeting lesson plans that have been developed are practical to use.

The results of the assessment of the implementation of the lesson plans in the third meeting showed that the mode result from the overall score given by the observer was 4 so that it was included in the very good category based on table 3. In accordance with Borich (1994), lesson plans can be said to be reliable if the Percentage of Agreement (R) 75.00% and from the results of the observer's assessment of the reliability of the implementation of lesson plans all have a score of 100% in each indicator. These results indicate that the third meeting lesson plans that have been developed are practical to use.

The results of the recapitulation of observations on the implementation of blended learning in the first, second, and third meetings presented in tables 4, 5, and 6 have been carried out well. The overall mode from the first, second, and third meetings got a score of 4 in the very good category. Most of the Percentage of Agreement (R) was 100, some others got 85.71, namely at points 8 and 9 in the first and second meetings. This is because some students are less enthusiastic, but this can be overcome by re-motivating students to be enthusiastic about the knowledge presented by the teacher. The acquisition value (R) is still above 75.00% so it can still be said to be reliable. From these results, it can be concluded that the Cluster-Blended Learning lesson plans is practical to use (Boelens et al., 2017). This shows that the activities carried out by students are in accordance with the learning activity plans made by the teacher. Learners have more opportunities to develop themselves, explore information, and improve their social competence (Dwiningsih et al., 2017).

The next practical assessment is in terms of student response questionnaires. Response questionnaires were used to collect information about student responses to learning tools that had been developed. Questionnaires are given after students finish carrying out learning. The results of the student response questionnaire analysis can be seen in Table 6.

Table 6. Results of student response questionnaire analysis.

No	Statement	Response Yes	 No	Percentage (%)	Category
1	I can understand the concept of learning chemistry on redox material with the blended learning model used by the teacher.	34	1	97,14	Very good
2	I feel happy and interested in learning chemistry on redox material with the blended learning model used by the teacher.	33	2	94,29	Very good
3	I feel that learning chemistry is on redox material with the blended learning model used by the teacher. implemented in a systematic, clear, and meaningful way.	28	7	80	Good
4	I find it easier to understand redox material with the blended learning model used by the teacher.	34	1	97,14	Very good

Several aspects have been responded by students include; 1) Aspects of students' understanding of redox material with the blended learning learning model gave a positive response with a percentage of 97.14% so it was included in the very good category; 2) Aspects of interest and motivation of students in learning learning gave a positive response with a percentage of 94.29 % so that it is in the very good category; 3) Aspects of student interest in learning chemistry on redox material with the blended learning learning model give a positive response with a percentage of 80.00% so that it is in the good category; 4) Aspects of implementing systematic, clear, and effective learning means to give a positive response with a percentage of 97.14% so that it is included in the very good category; 5) Aspects of the relevance of the material to everyday phenomena give a positive response with a percentage of 100% so that it is included in the very good category; 6) Aspects of students' enthusiasm in participating in activities learning gives a positive response with a percentage of 85.71% so that it is included in the good category so that it can be concluded that the analysis of student responses to the development of Cluster-blended learning teaching materials and the implementation of learning with blended learning obtained a percentage of 92.38% of students agreeing or having a positive response to the statement. All aspects of the student response questionnaire in the development of the ILAU cluster-blended learning that are feasible, practical and interesting for students with a percentage ≥6.01% (Damayanti, 2017) .

Effectiveness

The effectiveness of the cluster blended learning teaching materials that have been developed is reviewed through the results of the student's scientific literacy ability test consisting of a pretest (test before learning is carried out) and posttest (test after learning is carried out) for Clusters A and B. This student's scientific literacy ability test aims to determine whether students experience changes in increasing scientific literacy skills. The results of the Cluster A and Cluster B students' scientific literacy tests which showed that there was an increase in student scores from pretest to posttest were presented in Figure 3.

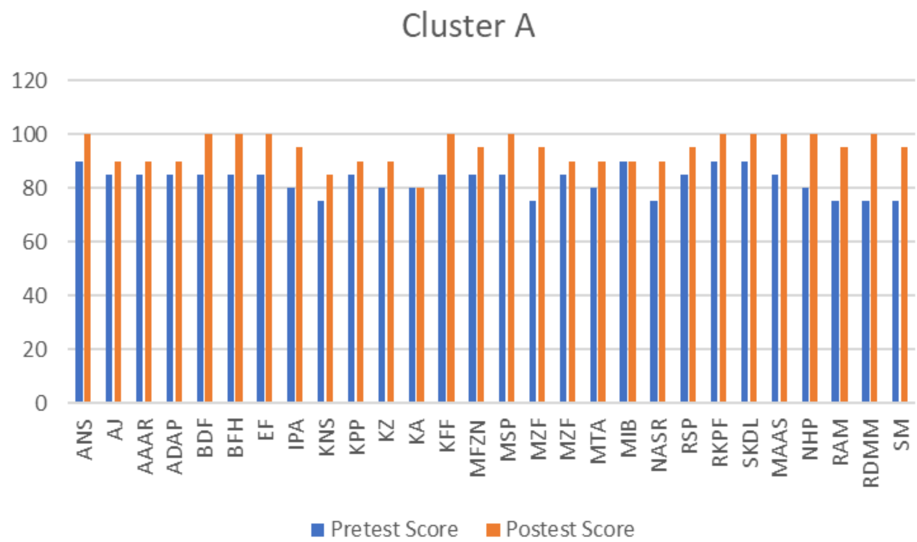

Figure 3. Bar chart of Cluster A scientific literacy test results on redox material.

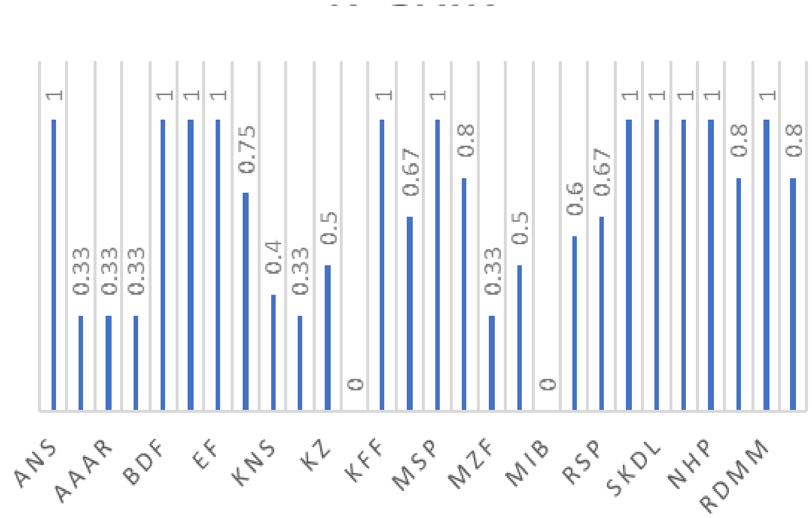

Figure 4. N-gain score science literacy cluster A

Figure 3 and Figure 4 in Cluster A, it shows that from the proposed test, the pretest score of all students in Cluster A increased after the posttest was carried out with an average N-Gain value of 0.78 in the high category. It can be seen that the majority of Cluster A students with very good criteria were 23 students after the posttest was carried out. this shows that cluster-blended learning teaching materials on redox materials have an effect on increasing students' scientific literacy skills. In Cluster B, it shows that from the proposed test, the students' pretest scores increased after the posttest with an average N-Gain value of 0.65 in the medium category. It can be seen that the number of students with very good criteria is 6 students after the posttest, while 38 students are in good criteria, two students are in good enough criteria and one student in not good criteria, this shows that cluster-blended learning teaching materials on redox materials have an effect on increasing students' scientific literacy skills.

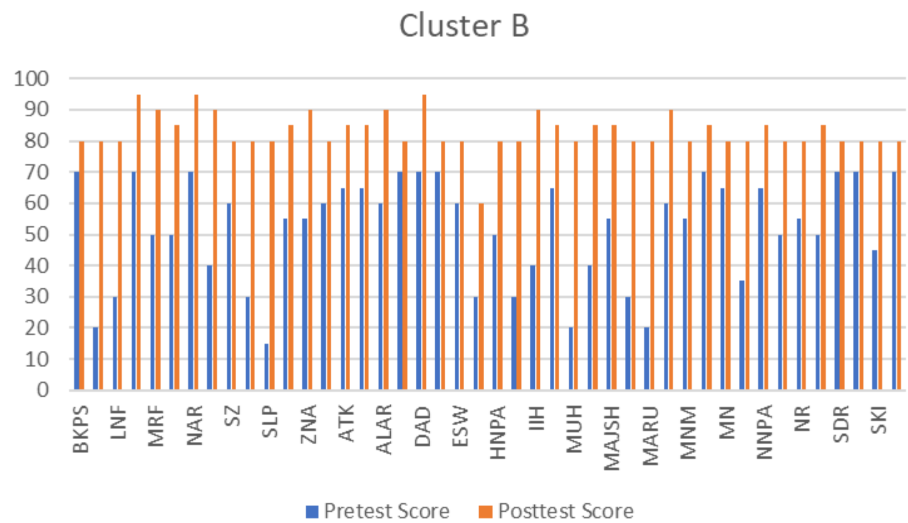

Figure 5. Bar chart of Cluster B scientific literacy test results on redox material.

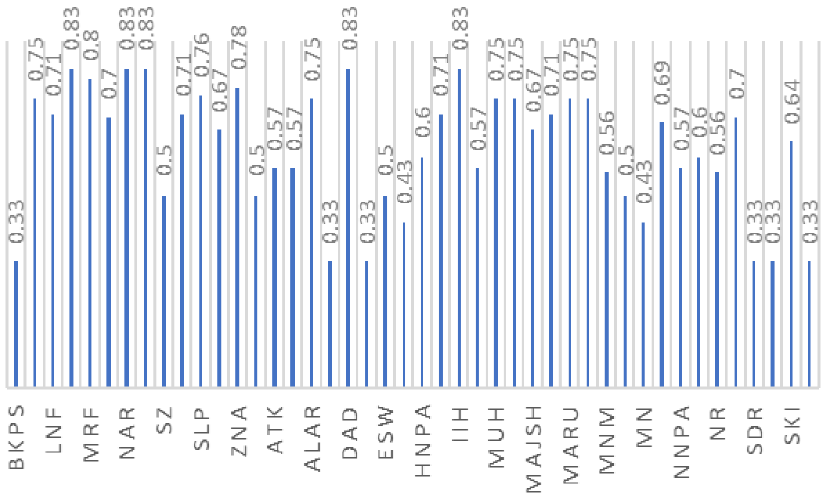

Figure 6. N-Gain Score Science Literacy Cluster B.

Based on the research conducted, researchers have proven that cluster-blended learning teaching materials can improve students' scientific literacy skills on redox materials. This is in accordance with the blended learning syntax proposed by Ramsay which is suitable to be used to improve scientific literacy because each learning phase can contain all aspects of scientific literacy that will be given. Each pretest and posttest questions that have been prepared have been adapted to aspects of scientific literacy. Aspects of scientific literacy involved in the preparation of pretest and posttest questions, namely, aspects of context, aspects of content, and aspects of competence. The blended learning syntax related to scientific literacy aspects is very suitable to improve students' scientific literacy skills. The syntax of blended learning phase 1 seeking of information is related to aspects of context, competence, explaining scientific phenomena, content knowledge, epistemic knowledge, and attitudes. Phase 2 of the acquisition of information relates to aspects of context, competence, explaining scientific phenomena, content knowledge, epistemic knowledge, procedural knowledge, and attitudes. Phase 3 synthesizing of knowledge is related to aspects of context, competence, explaining scientific phenomena, content knowledge, epistemic knowledge. Supported by Dwiningsih's research (2017), the combination of offline and online learning is feasible to use in learning and the statement of Nisrina et al. (2020), that the blended learning learning model is a form of learning flexibility with current conditions, comfortable for students, compatible with the science material presented and is expected to support students' scientific literacy can strengthen this research. Based on the results of the research above, it can be concluded that the cluster-blended learning teaching materials developed are suitable for learning and can improve students' scientific literacy on redox materials.

CONCLUSION

Based on research conducted on the developed cluster-blended learning teaching materials, 4 cluster-blended learning teaching materials were produced, namely: (1) Syllabus; (2) Lesson Plans; (3) Independent Learning Activity Unit; (4) Pretest-posttest Question grid. The results of the analysis regarding the feasibility assessment are reviewed from the aspects of validity, practicality, and effectiveness. the overall cluster-blended learning teaching materials developed were declared feasible because they had met the criteria for validity, practicality, and effectiveness. This research only describes in general terms about chemistry learning, so chemistry learning specifically can used for future research.

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***Arisy Erwin Junaidah, M.Pd. (Corresponding Author)**
Postgraduate Programe of Science Education, Univeristas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: arisy.19020@mhs.unesa.ac.id

Prof. Dr. Erman, M.Pd.
Postgraduate Programe of Science Education, Univeristas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: erman@unesa.ac.id

Dr. Rahardjo, M.Si.
Postgraduate Programe of Science Education, Univeristas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: rahardjo@unesa.ac.id