Development of Integrated Curriculum Student Worksheet to Train Student Scientific Literacy Skills in Reaction Rate Material

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Abstract:Development of Integrated Curriculum Student Worksheet to Train Student Scientific Literacy Skills in Reaction Rate Material. This research aims to describe the feasibility of integrated curriculum student worksheet to train student scientific literacy skills in reaction rate material assessed from validity, practical, and effectiveness criteria. This research uses Research and Development (R&D) method until limited the trial stage. The instruments are the review and validation, activities observation, student questionnaire, and science literacy skill test sheets. The developed student worksheet was tested on 13 students of XI grade at State Senior High School of 1 Grati Pasuruan that already accept reaction rate material. The validity of student worksheet is obtained based on assessment from two chemistry lecturers of Universitas Negeri Surabaya and two chemistry teachers of State Senior High School of 1 Grati and obtained a percentage are 91,46% for construct and 88,96% for content validity with both in very valid category. The practical of student worksheet is obtained based on student response and activities observation who get positive response of 98,82% and relevant student activities result of 98,83% both with very valid practical category. The effectiveness of student worksheet is obtained based on test result of student science literacy skills where student declared as complete with value range 83,9-96,8 and N-gain value of 0,8 with high criteria. Each domain of scientific literacy skills include science context, science knowledge, science competencies, and attitude towards science got percentages sequestially 90%, 91%, 91%, dan 96%.

Keywords: Integrated Curriculum; Scientific Literacy Skills; Student Worksheet; Reaction Rate.

Abstrak: Pengembangan LKS Kurikulum Terpadu untuk Melatih Keterampilan Literasi Ilmiah Siswa pada Materi Laju Reaksi. Penelitian ini bertujuan untuk mendeskripsikan kelayakan LKS kurikulum terpadu untuk melatih keterampilan literasi sains siswa pada materi laju reaksi ditinjau dari kriteria validitas, praktis, dan keefektifan. Penelitian ini menggunakan metode Research and Development (R&D) hingga terbatas pada tahap uji coba. Instrumen yang digunakan adalah review dan validasi, observasi kegiatan, angket siswa, dan lembar tes keterampilan literasi sains. LKS yang dikembangkan diujikan pada 13 siswa kelas XI SMA Negeri 1 Grati Pasuruan yang sudah menerima materi laju reaksi. Validitas LKS diperoleh berdasarkan penilaian dari dua dosen kimia Universitas Negeri Surabaya dan dua guru kimia SMA Negeri 1 Grati diperoleh prosentase 91,46% untuk konstruk dan 88,96% untuk validitas isi. keduanya dalam kategori sangat valid. Praktik LKS diperoleh berdasarkan respon siswa dan observasi aktivitas yang mendapatkan respon positif sebesar 98,82% dan hasil aktivitas siswa relevan sebesar 98,83% baik dengan kategori praktik sangat valid. Keefektifan LKS diperoleh berdasarkan hasil tes keterampilan literasi sains siswa dimana siswa dinyatakan tuntas dengan rentang nilai 83,9-96,8 dan nilai N-gain 0,8 dengan kriteria tinggi. Masing-masing ranah

keterampilan literasi sains meliputi konteks sains, pengetahuan sains, kompetensi sains, dan sikap terhadap sains mendapat persentase secara berurutan 90%, 91%, 91%, dan 96%.

Kata kunci: Kurikulum Terpadu; Keterampilan Literasi Ilmiah; Lembar kerja siswa; Laju reaksi.

- **INTRODUCTION**

In 21st century, the main concern of education is to prepare students for life and work in society. Regarding the 21st Century Skills Implementation Guide in Highschool, 21st-century learning is a learning process by integrating literacy skills, knowledge skills, skills and attitude, and mastering technology (Sutanto, 2017). To improve the education, government has established the 2013 Curriculum revised to emphasizes that the learning process could deliver students to fulfill the 21st century capabilities.

Regarding the National Law Number 20 of 2003, the aim of national education is to develop abilities and form a dignified national character and civilization, aim to develop the potential of student to become faithful, have noble character, healthy, knowledgeable, capable, creative, independent, democratic and resnponsibleBased on Sutanto (2017), regarding Regulation of National Ministry of Education Number 20 of 2016 about Competency Standards for Education Unit Graduates, students in Senior High School is expected to have competencies to form and apply the information and factual, conceptual and procedural knowledge at a technical, specific and complex level, and able to relate all knowledge in the contextof theirselves, family, school, community and the natural environment around, nation and state. Those competencies explained above are related to scientific literacy skills.

Scientific literacy according to PISA is defined as the ability to use scientific knowledge and information, to identify questions and to draw conclusion according to the facts and data and use it to understand and make decisions regarding nature and its changes that occur due to human activities (OECD, 2019a). PISA establishes four major dimensions of scientific literacy, consist of scientific competencies, scientific knowledge, attitude towards science, and scientific context (OECD, 2019b).

Learning is the influence process on behavior, knowledge, and thinking skills through experience (Santrock, 2011). The Learning process, include chemistry subject, basically aims to build scientific literacy of students. But in reality, students are not able to use scientific knowledge nor apply it in daily life. Research conducted by PISA shows that student literacy skills in Indonesia are still low. In 2012, the average score of Indonesian students scientific literacy was 382 and got 64th place from 65 participated countries (OECD, 2014). In 2015, Indonesia placed at 62nd from 70 participated countries with an average score was 403 (OECD, 2015). In 2018, the average score of Indonesian student scientific literacy decreased to 396 and placed at 70th of 78 participated countries (OECD, 2019a).

Others research also support PISA about student scientific literacy skill in Indonesia. Research conducted by Listyaningrum and Yonata (2018) show that 76,19% of student had the competencies to explain unfavorable phenomena, 69% of student were not good at evaluating and designing scientific investigations, and 38% of student were less in interpreting scientific data dan evidence. Research by Vinandari and Novita (2019) show that students with low scientific literacy skill were 81,49% from the participated students. This also supported by the result of teacher interview that learning process is

still teacher-centered and scientific literacy skills are uncommonly used in the learning process. This condition is worse due to pandemic of COVID-19 where the learning process is only done through online platfrom (Google classroom) which limited the interaction between students and teachers.

There are some reasons that caused the low scientific literacy skills which influenced by learning process at school. Firstly, the low scientific literacy skills is influenced by the conventional learning habit in science and ignore the importance of science reading while research by Shaffer, Ferguson, and Denaro (2019) found that reading comprehension is a critical component of scientific literacy skills. Secondly, the student's ability in interpreting graph/table is limited because students usually only fill in the table that already prepared by teacher (Rahayu, 2015). Thirdly, student isn't used to do scientific literacy item tests (Sariati, 2013). One way to improve is by the use of integrated curriculum with the help of student worksheet.

Integrated curriculum is an integrated model that integrates scientific content and abilities, practical skills, attitudes, and values. Toharuddin (2011) states that integrated curriculum is an approach to learning as a process for linking and combining teaching-related material in a subject or between subjects to provide meaningful learning experiences for students. There are ten models of integrated curriculum by Fogarty (1991), one of them is integrated type which there are overlapping of skills, concept, and attitudes. Thus, integrated curriculum is suitable for science learning and train scientific literacy skills for students (Toharuddin, 2011). Science curricula have positive effect on student science knowledge, skills, and attitude which also significally help student for achieving 21st Century skills (Kan'An, 2018).

Student worksheet is one of the learning media. Student worksheet is a collection of sheets containing material, summaries, and instructions for carrying out tasks and activities of students that serve as study guides where the material in it refers to basic competencies (Prastowo, 2011). Hidayatin and Mitarlis (2018) state that student workheet in the field only contain large amounts of material accompanied by question exercises without any analysis to answer a scientific question and do not use the scientific method.Astra, Nasbey, and Muharramah (2015) state that student worksheet in the field only contain question exercises without any analysis question and do not use the scientific method to support student in discovering concept by themselves. It means that student worksheets in the field are less of scientific questions and can't be used to fulfill student scientific literacy skills.

- **METHOD**

This research is a student worksheet development study that uses the Research and Development (R&D) method until the limited trial stage (Sugiyono, 2015). The subjects in this study were 13 students of XI grade science at State Senior High School of 1 Grati Pasuruan on even semester who had diverse academic abilities and had received reaction rate material. The instruments used in this study include : study sheets, validation sheets, student questionnaire response sheets, student activity observation sheets and students scientific literacy skills test sheets. Feasibility of student worksheet is reviewed based on validity, practical, and effectiveness (Nieveen and Flomer, 2013).

The validity of student worksheet was assessed from content validity and construct validity. Validity was carried out by two chemistry lectures and two chemistry teachers using validation sheets. Then, the result in validation sheet is analyzed by quantitative descriptive method through percentages. The percentage is obtained by comparing the

collected scores from all validators with the criteria score. The assessment uses calculation from the Likert scale as presented in Table 1.

Table 1. Likert Scale

Value	Category
1	Not appropriate
2	Less appropriate
3	Quite appropriate
4	Appropriate
5	Very appropriate

(Sugiyono, 2015)

The collected data that has been calculated into percentages using a formula:

$$\% \text{ Percentage} = \frac{\sum \text{score obtained}}{\sum \text{score criteria}} \times 100\%$$

Score criteria = higest score for each item x number of item x number of respondents. Then the percentages is interpreted into score interpretation as presented in Table 2 below:

Table 2. Intepretation Score of Validation Result

Percentage (%)	Category
0-20	Not valid
21-40	Less valid
41-60	Quite Valid
61-80	Valid
81-100	Very valid

(Riduwan, 2013)

The student worksheet that was developed was said to be valid if the percentage results of validator's assesment fulfilled ≥61% with a valid or very valid category.

The practical of student worksheets was assessed from the student response and student activities during the learning process using student worksheet. The questionnaire student responses and observation of student activities were analyzed using descriptive analysis regarding the Guttman Scale presented in Table 3.

Table 3. Guttman Scale

Answer	Positive Answer Score	Negative Answer Score
Yes	1	0
No	0	1

(Sugiyono, 2015)

The collected data that has been calculated into percentages using a formula:

$$\% \text{ Percentage} = \frac{\sum \text{score obtained}}{\sum \text{score criteria}} \times 100\%$$

The percentage score then interpreted into score interpretation as presented in Table 4.

Table 4. Intepretation Score of Student Questionari Responses

Percentage (%)	Category
0-20	Not practical
21-40	Less practical
41-60	Quite practical
61-80	Practical
81-100	Very Practical

(Riduwan, 2013)

The student worksheet that was developed was said to be practical if the positive student responses and student relevant activities fulfilled each percentage results of ≥61% with a practical or very practical category.

The effectiveness of student worksheet was viewed from improving student scientific literacy skills. Analysis of student scientific literacy skills is done by pre-test and post-test result analysis using N-Gain Score. The amount of improvement is analyzed by comparing the difference between post-test and pre-test scores with the difference between maximum score and pre-test score (Vinandari and Novita, 2019). The formula od N-Gain score is:

$$\text{N} - \text{gain score} = \frac{\text{posttest score} - \text{pretest score}}{\text{maximum score} - \text{pretest score}}$$

The categories of improvement using N-Gain Score can be interpreted to categories as presented in Table 5.

Table 5. Categories of N-Gain Score Increase

N-Gain Score	Category
>0,7	High
0,7>g≥0,3	Medium
<0,3	Enough

The student worksheet that was developed was said to be effective if the n-gain score is ≥0,3 with a medium or high category.

- **RESULT AND DISCUSSION**

This research with title of "Development of Integrated Curriculum Student Worksheet to Train Student Scientific Literacy Skills in Reaction Rate Material" aims to develop and produce a proper learning media of worksheet and then be tested on 13 students which aims to obtain data of validity, practical and effectiveness. The data of validity is obtained by the result of expert validation. While the data of student scientific literacy skills is presented as the effectivess of the developed student worksheets and data of student response is presented as the practical of the developed student wroskheets.

Validity of Student Worksheets

Research and Development (R&D) methods adapted from Sugiyono (2015) until the limited trial stage is used for this research. The research stage consist of: (a) Potential and Problem Studies; (b) Data Collection; (c) Product Design; (d) Draft I Products; (e) Design Review; (f) Product Revision; (g) Draft II Products; (h) Design Validation; (i) Limited Trial.

Potential and Problem Studies

Potential and problem studies are done by collecting books, journals, and other relevant literature containing theories and studies result that support the research that would be conducted. This purpose is to provide an overview of the potential and problems of students in reaction rate. Curriculum analysis at Grati 1 of Senior High School is the first taken step in this research. The curriculum used in State Senior High School of 1 Grati Pasuruan is 2013 revised Curriculum with Essesnsial Basic Competencies for pandemic condition. The curriculum analysis is carried out include Core and Basic Competencies, Competency Achievement Indicators, and subject matter and learning models. The basic competencies to develop this student worksheet include: (1) 3.5 Determine the reaction order and reaction rate constant based on experiment result; (2) 3.6 Explain the factors that affected reaction rate using collision theory; and (3) 4.5 Design, conduct, conclude, and present the result from experiment of factors that affected the reaction rate and reaction order.

Based on the curriculum analysis, the materials contain reaction rate definition, collision theory, factors that affected reaction rate, and reaction order. The condition force the learning process to be online, so the students worksheet will be equipped with several features in order to make the chemistry learning process being more meaningful and to train student scientific literacy skills. Regarding the analysis result, it is possible to develop integrated curriculum students worksheet to train student scientific literacy skills in reaction rate materials.

Data Collection

Finding chemistry learning in State Senior High School of 1 Grati Pasuruan is done by using the interview method with the chemistry teacher. The result of the interview shows that chemistry learning process is limited because the scientific approach and scientific literacy skills are rarely used and tough to student because the learning process is still conventional and use teacher-centered. Moreover, the pandemic condition limit the reaction between teacher and student and most of the learning process is only done by giving assignments.

Product Design

The purpose of this stage is to design student worksheets based on integrated curriculum and scientific literacy. The design of student worksheet can be described through the following stages: (a) Determination of learning objectives to be achieved; (b) Materials collection; (c) Elements preparation. The student worksheet is based on integrated curriculum in integrated type in order to arrange the science materials where chemistry is being the main materials. The student worksheets develop based on scientific approach and domain of scientific literacy. There are four domain of scientific literacy skills and all of them are trained in the student worksheet, namely: (a) Science context

(personal, local, and global problem); (b) Science knowledge (content, procedural, and epistemic); (c) Science competencies (explaine phenomena scientifically, evaluate and design scientific inquiry, and interpret data and evidence scientifically); and (d) Science attitude (OECD, 2019b). Science attitude consists of positive attitude toward science, ability to use scientific method, knowledgeable, skilled in analyzing (Toharuddin, 2011). Based on the curriculum analysis, there are five pieces of developed student worksheet according to the materials, namely: (a) Concentration Effect; (b) Surface Area Effect; (c) Temperature Effect; (d) Catalyst Effect and; (e) Reaction Law and Orde.

The process of observing is presented on the pictures of phenomena and experiment video, asking question is presented in the form of questions, collecting occurs when after giving questions, writing basic theory and doing simple experiment or research, processing information occurs when the data has been collected after experiment and research and also in the form of analysis questions; then students will communicate answers and the result.

The developed student worksheet contains of video to show simple experiment about factors affecting reaction rate in order to fulfill the basic competencies of 2013 revised curriculum and to construct the student knowledge. According to Santrock (2011), learning is the influence process on behavior, knowledge, and thinking skills through experience. The practical work is an essential way for student in learning process because of its real demonstration and implementation (Alneyadi, 2019). Practical work is an activities where student observe or manipulate real objects or witness real and practical, for example are lab activities and demonstation besides real life experience. In order to support the practical work in online classroom, students need to do simpel experiment that can be done at home using materials that can be found around. The use of local learning resources will directly contribute to effective learning outcomes (Hernawati *et al.*, 2019). Video also promote student-centered learning and easily integrate with online learning system (Giannakos *et al.*, 2014) The use of video is effective to help students in learning science process and could be used as an alternative for discussion because video provides instructor tools and visualization (Ranga, 2017).

Review of Draft I

The draft I products was reviewed by one chemistry lecturer to get suggestion and input to improve the student worksheets. Based on the review results, student worksheets obtained suggestion and input, including : addition of some question to make student more reliable to analyze, uses of barcode and link to help student easily access e-books and videos, and more relating science topics to reaction rate material.

Revised Draft I

Further improvement of integrated student worksheet is based on suggestion and input that have been obtained after review process was carried out to result draft II.

Validation of Student Worksheet

The validition process is obtained by two chemistry lecturers from Universitas Negeri Surabaya and two teachers at State Senior High School of 1 Grati, Pasuruan. In the validation process, student worksheet was assessed based on some criteria of content validity and construct validity (Nieveen and Flomer, 2013). Content validity includes material suitability with 2013 curriculum, material suitability with scientific

literacy skills, suitability with domains of scientific literacy skills, suitability with integrated curriculum, video accuracy, and e-books accuracy. The result of content validity are as follows in Table 6. While for construct validity include presentation, language, and graphics criteria. Presentation aspects are consist of interesting cover which presented the content of student worksheet, enough space for student to write the answer, suitability of illustration and picture with the materials, and completeness of student worksheet component. Language aspects are consist of suitability with the correct Indonesian language rules, use of communicative language, and use of symbols properly. The result of construct validity are shown in Table 7.

Table 6. Content Validation Result

No.	Aspects Assesed	%	Criteria
1	Material suitability with 2013 Curriculum	92,33	Very valid
2	Material accuracy	90,50	Very valid
3	Material suitability with scientific literacy	90,00	Very valid
4	Suitability with scientific literacy domains	92,50	Very valid
5	Suitability with integrated curriculum	94,00	Very valid
6	Videos accuracy	91,88	Very valid
7	E-books accuracy	89,00	Very valid

Table 7. Construct Validation Result

Aspects	%	Criteria
Lingustic	88,17	Very valid
Presentation	89,50	Very valid
Integrity	89,20	Very valid

Based on the validation result, all component of validation, which are content validity and construct validity, can be said to be valid because they have percentage with average sequentially 88,96% and 91,46% in a very valid category.

Limited Trial

The feasibility in terms of practical and effectiveness are assessed through limited product trial. The practical of developed student worksheet is assessed from the result of student response and student relevant activities.

Practical of Student Worksheets

The practical of student worskheet is assessed through limited product trial by using student response and student relevant activities during the learning process using the developed student worksheet . The student questionnaire response is separated into students using google form and consist of 13 questions. The result of student response shown in Table 8. Based on the result, the average positive response as much as 98,82% with very practical category. Almost all the assessed aspects in student response get 100% positive respons. The lowest response is on language aspect as 84,62% with 2 students give negative response. The negative responses come because of the use of certain term in student worksheet that student are not used to hearing but this problem resolve by teacher explanation during the learning process. Most positive responses come from the use of video and e-book which effectively help students in understanding the material, practices and improve their scientific approach that related to scientific literacy skills and

could be used as alternative for discussion because video provide instructor tools and visualization (Ranga, 2017). Example of student response who give postivie response for the use of video and e-book is:

"Saran saya link dan video tentang materi yang dipelajari lebih diperbanyak karena bagi saya dengan melihat video dan membuka referensi materi dari berbagai sumber membuat saya lebih paham dengan materi yang dipelajari tersebut"

"My suggestion is that links and videos about the material being studied should be reproduced because for me by looking at the video and opening reference material from various sources it makes me more familiar with the material being studied"

Table 8. Student Questionnaire Response Result

No	Questionnaire Aspect	%	Criteria
1	Student worksheet help to develop concept in reaction rate	100,00	Very practical
2	Student worksheet help to observe and explain scientific phenomena	100,00	Very practical
3	Student worksheet help to design and evaluate scientific research	100,00	Very practical
4	Student worksheet help to interpret data and evidence of research result	100,00	Very practical
5	Student worksheet help to motivate student	100,00	Very practical
6	Student worksheets interest student	100,00	Very practical
7	Student worksheet use appropriate language and easy to understand	84,62	Very practical
8	Student worksheet help to understand concept aplication to phenomena around	100,00	Very practical
9	Student worksheet make student to have scientific literacy skills	100,00	Very practical
10	Integration with other science topic help in understanding and developing chemistry concept	100,00	Very practical
11	Integrated curriculum is suitable to use in chemistry learning	100,00	Very practical
12	Video help student to understand the learning materials	100,00	Very practical
13	Video is suitable in learning process	100,00	Very practical

Student activities observation sheet is assessed student relevant activities related to integrated curriculum and scientific literacy skills. The limited trial is done three times with two observers for each meeting. The result of student relevant activities is shown in Table 9. Practical aspect in term of student-relevant activities is gained average of 98,83% with very practical category. The result shows that students were focus during the learning process using developed student worksheets in limited product trial. Integrated curriculum provides meaningful learning packaging and enable students to be active. The learning process with integrate some related discipline and daily life phenomena could increase student motivation and interest (Toharuddin, 2011).

Table 9. Student Relevant Activities Result

No	Assesment Aspects	%	Criteria
Integrated Curriculum			
1	Student give attention with presented phenomena	100,00	Very practical
2	Student do the task about related physics, mathematics and biologyc knowledge	100,00	Very practical
Scientific Literacy			
3	Student identify points and problem from the presented phenomena in daily life (scientific content)	97,43	Very practical
4	Student formulate the problem related to presented laboratory phemonema (scientific competencies-attitude)	100,00	Very practical
5	Student design the experiment and research by reading provided literature or other related literature (scientific competencies-attitude)	100,00	Very practical
6	Student observe the video or reading the literature related to the experiment or research that reflect positive attitude toward science (scientific attitude)	100,00	Very practical
7	Student write the research result in student worksheet (scientific competencies-attitude)	100,00	Very practical
8	Student answer the analysis questions based on the experiment/research result (scientific competencies-attitude)	97,43	Very practical
9	Student make conclusion based on experiment/research (scientific competencies-attitude)	100,00	Very practical
10	Student connect the experiment/research result with the phenomena earlier (scientific competencies-attitude)	100,00	Very practical
11	Student connect the research result with daily life that reflect ineterest toward science (scientific attitude)	92,31	Very practical

Effectiveness of Student Worksheets

The effectiveness of integrated curriculum student worksheets to train students scientific literacy skills was assessed from improving scientific literacy skills in pretest and posttest. The test contais 10 test using open-constructed response with include all domains of scientific literacy skills. The test result of student scientific literacy skill is shown in Table 10.

Table 10. Student Scientific Literacy Result

No	Student	Pretest	Posttest	N-Gain	Criteria
1	APP	35,5	87,1	0,8	High
2	YOS	32,3	90,3	0,9	High
3	FAL	29,0	87,1	0,8	High
4	DDL	35,5	87,1	0,8	High
5	NNF	22,6	83,9	0,8	High
6	HM	61,3	93,5	0,8	High
7	ERY	58,1	93,5	0,8	High

8	LMT	38,7	96,8	0,9	High
9	MNM	35,5	90,3	0,9	High
10	DRM	22,6	93,5	0,9	High
11	LLM	38,7	87,1	0,8	High
12	IKD	19,4	87,1	0,8	High
13	LEP	35,5	90,3	0,9	High

Based on the result, it is known that the N-Gain value obtained by 13 students are >0,7 with average 0,8 and high category. The N-Gain value is obtained form pretest and posttest. Pretest is done before the lerning process using the developed student worksheet to know the initial abilities of student in scientific literacy skills, while posttest is done to measure the student scientific literacy skills after the learning process. The student result also shown that all students got score ≥75 which above the minimum completeness criteria. Student worksheet is proven to increase student outcomes and skills because it can interest and motivated student so the learning process will be more meaningfull (Astra, Nasbey, and Muharramah, 2015). Based on Listyaningrum and Yonata (2018), the use of student worksheet increase the student scientific literacy skills. Based on Vinandari and Novita (2019), the use of student worksheet also effective to train student scientific literacy skills with N-Gain value about 0,8-1 with high category. The use of integrated curriculum that provide meaningfull learning where student can gain deep understanding concept, thus student can apply it in scientific issue and create scientific idea related to sceintific literacy skills (Kan'An, 2018). The analysis of each scientific literacy domain is shown in Figure 1.
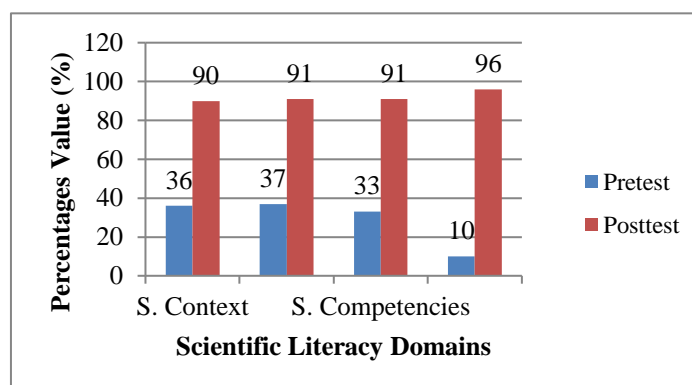

Figure. 1. Scientific Literacy Domains Analysis

The diagram show that student scientific literacy skills in every domains increase and gain high percentage posttest consist of 90% in scientific content, 91% in scientific knowledg and competencies, and 96% in scientific attitude. The result of pretest posttest and each domains analysis show that student scientific literacy skills gain improvement. Student worksheets enable students to be interested, motivated, active and to improve outcomes (Astra, Nasbey, and Muharramah, 2015). Integrated curriculum is learning process by integrates several related subjects to provide meaningful learning and effective to train scientific literacy skills (Toharuddin, 2011). The use of integrated science curricula helps students to understand scientific concepts, acquire knowledge of scientific processes, and apply wide range of knowledge and skills to effectively produce, evaluate, present, and clarify new ideas (Kan'An, 2018). This is also supported by the use of video

which helps students in understanding the material and as alternative for discussion because video provides instructor tools and visualization (Ranga, 2017). The availability of e-book that can be assessed by student will help students in reading comprehension which as the critical point in scientific literacy skills (Shaffer, Ferguson and Denaro, 2019). By reading and understanding science well, students have self-confidence and science interest which have positive correlation with scientific literacy skills (Fakhriyah *et al.*, 2017). Thus, the developed integrated curriculum student worksheet can be declared as effective to train students scientific literacy skills.

▪ **CONCLUSION**

Based on the formulation of the problem and the discussion it can be conclude that the integrated curriculum student worksheet to train student scientific literacy skills in reaction rate materials is deemed feasible because it has obtained a percentage of ≥61% for all aspects. The validity of the content and construct validity by chemistry lecturers and teachers obtained very valid criteria with percentage of content validity is 91,46% and construct validity is 88,96%.The practical aspect of the student worksheet obtained very practical criteria based on the positive result from student of 98.82% and supported with the relevent student activities result of 98,83% both with very practical category.The effectiveness of student worksheet to trains scientific literacy, the student worksheet considered effective in term of the increasing scientific literacy test result where all student are improved with N-gain average value of 0,8 with high criteria and declared complete with value range 83,9-96,8 which ≥75 above the minimum completeness criteria.

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