Correlation reading infusion (RI) and scientific literacy competence (SLC) XI grade students on sound wave topic

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Abstract. The results of previous research shows that there are difficulties in establishing SLC if students do not have enough knowledge, therefore students need to be given support knowledge through RI. Experimental study with one group pretest posttest design using a sample of 40 students were taken by cluster random sampling of a population of 238 students of class XI in one high school in Bandung aims to get an idea about the correlation of RI with SLC. RI instrument developed using a conceptual model and results of logical validity with CVR and CVI analysis obtained by value of 0.99 with the appropriate category and SLC instruments developed under the framework of PISA 2015 in the form of 11 questions covering descriptions explain scientific phenomena, designing scientific research, and evaluate and interpret scientific research with empirical test results show the range value of the validity 0,36-0,74 with a valid category and reliability of 0.72 to a high category. Results of research with correlation analysis product moment correlation values RI with SLC was 0.97 with a very high correlation category. This suggests that a class XI student in high school it was important reading material infusion on sound waves that SLC development process becomes easier.

1. Introduction
Scientific literacy is defined as the scientific knowledge and scientific methods used to investigate an issue and decision making on the problems of today's society reflects the development of science and technology developments are rapid. Indonesia is predicted to obtain a demographic bonus in 2020-2030, which means that the number of productive age in Indonesia reached 70 percent. In support of this, it should be learners equipped with more than just the ability to complete the task, but also equipped with the ability to participate in the process of problem-solving and decision-making to achieve sustainable development in modern society [1]. This implies the importance of train competence scientific literacy allow every student to take part in making decisions and appropriate action is beneficial to the welfare and safety of people and the environment, so that they can productively adapt and operate in a knowledge-based society [2]. Therefore, scientific literacy is a competence that should be procured for everyone, because the level of development of a nation is determined by the quality of human resources with competence in the use of science and technology to solve problems and decision-making [3], [4], [5].

The importance of scientific literacy competence provisions, resulting in a change of policy directions in the world of science education. Scientific literacy as a main objective in the education of Science [6]. Developed countries such as the people's Republic of China and South Korea have made
scientific literacy as a State program to boost strength and skill in Science [7]. Likewise with Indonesia, learning science curriculum in Indonesia that in the learning process, learners need a nudge to understand and apply knowledge, solve a problem, find everything for her myself, and strive to realize the ideas that they have [8]. Study results of PISA (Program for International Student Assessment) in 2015, the competence of scientific literacy Indonesia are below the OECD average score or be in the order of lowest total 72 9 countries [9]. This indicates that there are still many learners Indonesia which is in level 1, this means that learners have difficulty in using scientific knowledge and only capable of using scientific knowledge which is limited to the context of the General [7].

Based on interviews and observations at three schools in the city of Bandung, teaching physics at the school has not made a scientific literacy competencies as learning objectives. For example, learning in the classroom is not contextual and experiments carried out on school still cookbook, so that learners difficulty in applying scientific methods such as hypothesized, define variables, formulate an experimental procedure, and analyze data. Research competence profile of scientific literacy in five schools in the city of Bandung show as much as 54.6% of students have been able to explain scientific phenomena clearly, some 53.2% of learners are able to evaluate and plan for scientific research, and 49% of learners can interpret data and scientific evidence [10]. This result show that scientific literacy need to train in the best way, especially on interpret and proof data aspect that have smallest score.

The main key to improving the scientific literacy of learners is to make meaningful science learning [11]. In scientific literacy curriculum, reading is a means to achieve a meaningful science learning. Researchers claim that it takes in the learning of science to develop scientific literacy competency is giving emphasis to activate minds-on learners. The results obtained that reading is integrated in learning science can play an important role in achieving the emphasis on the activity mind-on learning science, learners can understand and explain the meaning of a scientific concept underlying the clear language, which is an important aspect of scientific literacy competence.

In Indonesia has been a lot of research to identify ways to develop scientific literacy competence. By integrating the task of reading the scientific learning. Given the task of reading consists of three parts: Reading (learners are provided readings related to the concepts that will be studied), conceptual construction (learners are given a question to build a concept that exists in the literature). Based on the results of research, in developing scientific literacy competency, learners of the difficulties in the process of science learning because it does not have enough knowledge to discuss with the teacher. Therefore, additional information is required that can equip learners in learning [12]. Given the description of the problems above, this research aims to determine the correlation value between reading infusion strategy and scientific literacy competency.

2. Methods
To calculate the correlation between reading infusion strategies with scientific literacy competence performed with product moment correlation technique with a rough figure put forward Pearson as follows.

\[
r_{xy} = \frac{n \sum XY - (\sum X)(\sum Y)}{\left(n \sum X^2 - (\sum X)^2\right)\left(n \sum Y^2 - (\sum Y)^2\right)^{1/2}}
\]  

\[(1)\]

Description:
\( r_{xy} \): the correlation coefficient between variables X and Y
\( n \): number of subjects
\( X \): the score of each item
\( Y \): the total score of each item

To interpret the value of the correlation coefficient obtained from the above calculations, the validity of the criteria used items as shown in Table 1 below.
The subject of this research is the students of Class XI SMAN 9 Bandung consisting of 40 people. This research uses the instruments of scientific literacy competency description test with reliability 0.89. Test instruments used in the research have been validated by an expert. The validation is done by two lectures and one high school teacher, then analyzed by calculating the value of each number CVR as shown in Table 2 below.

### Table 2. Validity Test Results Scientific Literacy Competency Test Instruments

| No. | Expert Validation | N. | N | CVR | Criteria | Decision |
|-----|-------------------|----|---|-----|----------|----------|
| 1.  | 0 1 1 3            | 2  | 3 | 0.33| Unexact  | Revised  |
| 2.  | 0 1 1 3            | 2  | 3 | 0.33| Unexact  | Revised  |
| 3 A | 1 1 1 3            | 3  | 3 | 0.99| Very exact| Used     |
| . B | 1 1 3 3            | 3  | 3 | 0.99| Very exact| Used     |
| 4.  | 1 1 3 3            | 3  | 3 | 0.99| Very exact| Used     |
| 5.  | 1 1 3 3            | 3  | 3 | 0.99| Very exact| Used     |
| 6 A | 1 1 3 3            | 3  | 3 | 0.99| Very exact| Used     |
| . B | 1 1 3 3            | 3  | 3 | 0.99| Very exact| Used     |
| 7.  | 1 0 1 2            | 3  | 3 | 0.33| Unexact  | Revised  |
| 8.  | 0 1 1 2            | 3  | 3 | 0.33| Unexact  | Revised  |
| 9.  | 1 0 1 2            | 3  | 3 | 0.33| Unexact  | Revised  |
|     |                   |    |   |     |          |          |
|     | CVI               |    |   |     |          |          |
|     | 0.69              |    |   |     |          |          |
|     |                   |    |   |     |          | Exact    |

After the instrument is validated and corrected in accordance with the suggestions given by the third expert, then the instruments need to be tested first in high school that would be used as a place of research. The instrument's trial results data is then analyzed. As for the analysis of tests conducted among others: analysis of the validity of the grain problem, reliability, degree of difficulty, and the power criterion. The following data are shown the results analysis instrument mastery tests to see the validity of the distinguishing power, grain, and difficulty level. Decision making is a matter of accepted, accepted with revisions as shown in Table 3 below.

### Table 3. Validity analysis, level of difficulty, and differentiator Scientific Literacy Competence Test.

| Number | Number Value | Validity Category | Difficulty Level Value | Difficulty Level Category | Differentiator Value | Differentiator Category | Decisions |
|--------|--------------|--------------------|------------------------|---------------------------|----------------------|-------------------------|-----------|
| 1      | 0.43         | Valid              | 0.50                   | Medium                    | 0.45                 | Good                    | Accepted  |
| 2      | 0.36         | Valid              | 0.13                   | Difficult                 | 0.40                 | Sufficient              | Accepted  |
| 3 a    | 0.74         | Valid              | 0.13                   | Difficult                 | 0.40                 | Sufficient              | Accepted  |
| b      | 0.62         | Valid              | 0.78                   | Easy                      | 0.55                 | Good                    | Accepted  |
| 4      | 0.27         | Unvalid            | 0.50                   | Medium                    | 0.20                 | Poor                    | Revised   |
| 5      | 0.65         | Valid              | 0.20                   | Difficult                 | 0.65                 | Good                    | Accepted  |
| 6 a    | 0.64         | Valid              | 0.13                   | Difficult                 | 0.35                 | Sufficient              | Accepted  |
| b      | 0.46         | Valid              | 0.35                   | Medium                    | 0.30                 | Sufficient              | Accepted  |
| 7      | 0.50         | Valid              | 0.70                   | Medium                    | 0.55                 | Good                    | Accepted  |
| 8      | 0.43         | Valid              | 0.60                   | Medium                    | 0.55                 | Good                    | Accepted  |
| 9      | 0.45         | Valid              | 0.25                   | Difficult                 | 0.30                 | Sufficient              | Accepted  |

Reliability 0.72

High
The decision obtained from the analysis of the trial results i.e. There are 10 questions have meet the criteria so that these questions are accepted and can be used. However, there are still 1 reserved (2a) which do not meet the criteria so that the question of revision based on the advice received and enter from the experts.

### 3. Result and Discussion

The following results of the correlation value of reading infusion with the results of a competency-based test instruments scientific literacy are shown in Table 4 below.

| Table 4. Correlation Result |
|-----------------------------|
| Correlation                 |
| Category                    |
| 1st meeting                 | 0.72 | High |
| 2nd meeting                 | 0.76 | High |
| 3rd meeting                 | 0.78 | High |

Based on the results of the statistical calculation by using correlation pearson product moment based on table 4 correlation of reading posttest with a value of infusion has a category is very high, whereas when linked with pretest, a correlation value is low. This means awarding reading infusion has influence to increase scientific literacy competency.

Inquiry-based education serves as a very effective method to develop scientific literacy competence. In a traditional curriculum, education focused on content topics with little emphasis on capacity building and maintenance of scientific attitude. Teachers focus on the provision of information and the learner as a receiver. Education today should provide an opportunity to not only hear the explanation, but require practice to use such knowledge, but in the process of inquiry, learners are still difficulties in assimilating new knowledge gained from the process of inquiry. To increase engagement in learning, the ability to think critically, students should be involved in the process of inductive learning as learning Inquiry. In order to strengthen the scientific approach (scientific), integrated thematic (inter thematic lesson), and thematic (in a subject) needs to be applied to the discovery or inquiry-based learning [13-15]. To encourage the ability of learners so that they can generate a contextual work, either individually or in groups it is advisable to use problem-solving approach to learning (problem solved based learning).

Problems found that learners are not enough science when to discuss the process of Inquiry, so that new knowledge is not acquired. If a teacher does not give a proper apperception, learners will not achieve the desired knowledge of Constructivism because knowledge learners are not incompatible with the new knowledge that is introduced. Therefore, based on such research needed strategies Reading can assimilate knowledge Infusion of new and existing knowledge, so that it can assist learners in building new knowledge in the process of Inquiry.

### 4. Conclusion

Based on the results of the processing and analysis of data, it can be concluded, correlation between reading infusion and inquiry process during three consecutive meetings is 0.72 (high), 0.76 (high), and 0.78 (high). It means that reading infusion before inquiry process could enhance scientific literacy competence.

### 5. References

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