

Contribution of Science Literacy toward Biological Science Process Skills of High School Students in Urban and Rural Areas

Muh. Ilham Sakri¹, Arsad Bahri²

Universitas Negeri Makassar, Indonesia
210013301009[at]student.unm.ac.id

Universitas Negeri Makassar, Indonesia
arsad.bahri[at]unm.ac.id

Abstract: *The educational process must be increasingly considered and improved because there are so many challenges that will be faced in 21st century learning. 21st century learning is learning that integrates literacy skills, knowledge skills, skills and attitudes as well as mastery of technology. The educational process in Indonesia must have skills that are able to provide competitiveness in the 21st century learning process, one of which is scientific literacy skills. Defining scientific literacy is the ability to use scientific knowledge, draw evidence-based conclusions to understand and help make decisions about nature and through human activities. Scientific literacy is certainly expected to be able to grow science process skills in supporting and increasing the credibility of education in Indonesia. Science Process Skills are skills used to describe problems in scientific investigations, compose and find new knowledge in learning activities. This study was correlational research with ex post facto approach was investigated the correlation of science literacy toward biological science process skills. The samples of this study were 163 students of Senior High School in Jeneponto Regency as the rural area and in Makassar City, Indonesia, as the urban area. The science literacy and biological science process skill data were collected using essay test that validated before use. The data were analysis using simple regression analysis. The result of study showed that science literacy was contributed to biological science process skill as many as 25,8% (in rural area as many as 21,8, and in urban area as many as 23,4%). In developing scientific literacy skills in rural areas, there are many obstacles because the geographical location is quite far from urban areas, causing the lack of facilities and infrastructure needed to develop science process skills.*

Keywords: Science literacy, science process skills and biology learning

1. Introduction

Education as part of efforts to improve the welfare of human life contributes to national development. Facing the changes in the reform era and the globalization process that also affects life, it is necessary to have a vision and directed education. Vision of Education that the Indonesian national education system must be able to ensure equal distribution of educational opportunities, improve quality as well as the relevance and efficiency of education management to face challenges in accordance with the demands of changes in local, national, and global life so that it is necessary to carry out educational reforms in a planned, targeted, and sustainable manner [1], [2]. The targeted vision and mission are none other than the strategic vision and mission of national education.

The strategic vision and mission of national education refers to an understanding of the current map of educational problems. The essence of the development of national education is an effort to develop superior human resources in order to prepare society and the nation to face the era of knowledge as a competitive era [3], [4]. Education is very important because education is a necessity that is needed by all elements where the educational process must be increasingly considered and improved because there are so many challenges that will be faced in 21st century learning.

21st century learning has a very significant impact on the world of education, where the transition process from the

industrialization century to the age of knowledge demands that every area of life changes very quickly and must be able to adapt quickly. Likewise with education, where the general characteristics of the learning model in the age of knowledge are different from the characteristics of learning in the era of industrialization.

The era of industrialization gave special advantages to the education sector. Some of them such as learning facts, practice rules and procedures are replaced with learning in real world contexts, authentic through problems and projects, inquiry, discovery and discovery in the practice of the knowledge era. However, the learning pattern applied during the industrialization period was no longer in accordance with the era of knowledge, where the development of information and communication technology was growing so rapidly, and this technology was an important catalyst for the movement towards learning methods in the 21st century, especially in the field of education.

In the field of 21st century education, motivation alone is not enough to realize the ideals, there must be evidence or concrete forms and hard efforts from the Indonesian government and even all of us in welcoming the digitalization era. The existence of the 21st century is marked by the era of the industrial revolution 4.0 which in the 21st century made the century of openness or the century of globalization. Responding to the complex challenges of the 21st century, Indonesia in its educational process must make innovations that can certainly make significant developments in the In-

donesian education system. One of the innovations that have been carried out by Indonesian education is to formulate the 2013 curriculum.

The theme of curriculum development 2013 is to produce productive, creative, innovative and effective human beings through strengthening integrated attitudes, skills, and knowledge. It is realized that in the development of life and science in the 21st century there has been a shift in both characteristics and learning models. The thinking process of students in the 2013 curriculum is no longer a stage that only explains concepts and theories, but constructs knowledge in solving an existing problem. In an effort to improve the quality of education, Indonesia focuses on three aspects, namely strengthening character, higher thinking skills, and strengthening literacy.

Strengthening literacy is needed in this increasingly complex era [6], [7]. The ability of students in literacy will be a very useful foundation in navigating the competition of 21st century learning, including one of them in learning science. Science learning emphasizes more on providing direct experience to students related to topics that then exist in the science learning process that have a relationship with real life. Science learning is needed in everyday life to help answer problems in human life that can be identified. These problems can certainly be solved easily if students have scientific literacy.

In the education process in Indonesia, scientific literacy is certainly an urgent need that must be met in facing the challenges of 21st century learning. Scientific literacy is the ability to use scientific knowledge, identify questions and draw conclusions based on evidence to understand and help make decisions about nature and through human activities. . Scientific literacy is important for all elements of society because it will be very useful in navigating everyday life [8]. There are so many natural signs which of course will be a problem when someone does not have the scientific literacy to answer them. Literacy in the process emphasizes that students must have skills and be proficient in their application, because simply theorizing about literacy is not enough to meet the standards that exist in the challenges of the 21st century. Therefore, science process skills are needed that can make students' literacy skills better.

Science process skills are skills used to describe problems in scientific investigations, compose and find new knowledge in learning activities [9], [10], [11]. For students, science process skills are useful as an introduction to scientific thinking from an early age so that the thinking process can be neat and coherent. Seeing the importance of scientific literacy and science process skills for students, it is hoped that all elements of education in urban and rural areas can have them. In maximizing the results of the educational process, it is necessary to have support from various factors that can have a positive influence on the student learning process. Student success is influenced by many factors that come from inside and outside the student. The driving factor from within comes from itself. As far as possible the teacher should bring encouragement from within students during learning, for example linking learning with student interests or needs. External factors such as learning facilities, teacher

teaching methods, feedback systems and so on.

One of the urgencies in advancing education is the fulfillment of learning facilities. Adequate learning facilities will help improve students' competence and self-quality. In addition to helping students, the facilities will also help teachers to achieve maximum results in the teaching and learning process inside and outside the classroom. Seeing the urgency of the facilities that must be equipped, it is necessary to have equal distribution of learning facilities for all students in Indonesia in order to create a good equal distribution of education. However, until now there are still many students who have not been able to get proper facilities. Some of them are caused by the geographical location or the location of the school which is quite far from urban areas.

Geographical differences are a major factor in the spread of Scientific Literacy and Science Process Skills. Because it leads to uneven facilities and infrastructure by students in rural areas. Facilities such as laboratories, practicum tools and things that can support research are inadequate. Meanwhile, in 21st century learning, science process skills are needed that are evenly distributed in all regions in Indonesia. Of course one of the factors that make this happen.

2. Method

This type of research is ex post facto research which is correlational. This study aims to determine the contribution of scientific literacy toward the biological science process skills of students of class X Senior High School (SHS) in Makassar city as urban area and Jeneponto regency as the rural area. There were two variables studied in this study: the independent variable in this study was science literacy and the dependent variable was biological science process skills. The sample used is purposive sampling because the sample was taken with certain considerations. The samples of this study were students of class XI science at SHS 8 Makassar and SHS 13 Makassar, Makassar City and class XI science students at SHS 1 Jeneponto and SHS 11 Jeneponto, Jeneponto Regency.

The instruments used in this study consisted of test questions of scientific literacy and biological science process skills. The scientific literacy test was measured using a multiple choice test of 30 points. Items are compiled and developed based on learning indicators that are adjusted to the scientific literacy indicators from Gormally (2012). The science process skills test was measured using an essay test of 10 points. The essay test was developed based on indicators of science process skills from Rustaman (2005). Science literacy and science process skills tests were developed by researchers and validated prior to use. The instruments used were initially validated by experts and by empirical validation. Expert validation includes content validity and construct validity.

Empirical validity is the validity that comes from or is obtained based on observations in the field. In this empirical validity, questions are given to students who are not included in the research sample, but are still in the same

level of education as the research sample, where the number of students is 40 students. The item validity test means that an item is said to be valid if it has a large contribution to the total score. The reliability of a test is related to its consistency. A test is said to have high reliability if the test can provide consistent results.

3. Results

The summary of the regression analysis of the correlation between science literacy skills and students' science process skills is presented in Table 1 to Table 1 .

Table 1: Summary of the analysis of correlation variance between science literacy skills and students' biological science process skills

ANOVA						
Model	Number of Squares	df	Square Average	F	Signature.	
1	Regression	5045,946	1	5045,946	55,925	,000 ^b
	Remainder	14526,471	161	90,227		
	Total	19572.417	162			
a. Dependent Variable: scientific literacy skills						
b. Predictors: (Constant), Science Literacy Ability						

Table 1 shows that the results of the analysis of variance are statistically very significant (0.000), indicating that the relationship between scientific literacy skills and science process skills is very strong.

Table 2: Regression coefficient of correlation between scientific literacy ability and students' biological science process skills

Coefficient						
Model		Non-standard coefficient		Standard Coefficient	T	Signature
		B	Std. Error	Beta		
1	(Constant)	17,684	2.866		6.170	,000
	Science Literacy Skills	,439	0.059	,508	7,478	,000
a. Dependent Variable: scientific literacy skills						

In Table 2, the B value of both variables (scientific literacy and science process skills) and constants is 17.684. It can be seen that the regression equation is $y = 17.684 + 439X_1$

Table 3 shows that R square is very high (0.258) indicating that the effective contribution of scientific literacy and science process skills of students is 25.8%.

Table 3: Regression summary of the correlation between literacy skills and students' science process skills.

Model Summary				
Model	R	R Square	Customized R Square	Std. Estimated Error
1	,508	,258	,253	9.49876
a. Predictors: (Constant), Science Literacy Ability				

The summary of correlation regression analysis between scientific literacy skills and science process skills of high school students in Jeneponto Regency is presented in Tables 4 to 6.

Table 4: Summary of analysis of variance between literacy skills and biological science process skills of high school students in Jeneponto regency.

ANOVA						
Model	Number of Squares	df	Square Average	F	Signature.	
1	Regression	2060,730	1	2060,730	22.082	,000 ^b
	Remainder	7372.554	79	93.323		
	Total	9433,284	80			
a. Dependent Variable: Science Process Skills						
Predictors: (Constant), Science Literacy Ability						

Table 4 shows that the results of the analysis of variance are statistically very significant (0.000), indicating that the relationship between scientific literacy ability and science

process skills of high school students in Jeneponto district is very strong.

Table 5: Correlation regression coefficient between literacy ability and biological science process skills of high school students in Jeneponto Regency

Coefficient						
Model		Non-standard coefficient		Standard Coefficient	t	Signature.
		B	Std. Error	Beta		
1	(Constant)	14,215	5.736		2.478	0.015
	science literacy skills	,500	,107	,467	4,699	,000

Dependent Variable: Science Process Skills

In table 5, the B values for both variables (scientific literacy and science process skills) and constants are 14,215. It can be seen that the regression equation is $y = 14.215 + 0.500X1$.

Table 6: Summary of Regression Correlation of Science Literacy Ability with Biological Science Process Skills of SHS Students in Jeneponto Regency

Model Summary				
Model	R	R Square	Customized R Square	Std. Estimated Error
1	,467	,218	,209	9.66041
a. Predictors: (Constant), Science Literacy Ability				

Table 6 shows that R square is very high (0.218) indicating that the effective contribution of students' scientific literacy skills and science process skills is 21.8%.

The summary of the correlation regression analysis between scientific literacy skills and science process skills of high school students in Jeneponto Regency is presented in Table 7 to Table 9.

Table 7: Summary of analysis of variance between science literacy skills and biological science process skills for SHS students in Makassar

ANOVA						
Model	Number of Squares	df	Square Average	F	Signature.	
1	Regression	2171,300	1	2171,300	24,438	,000 b
	Remainder	7107,920	80	88.849		
	Total	9279,220	81			
a. Dependent Variable: Science Process Skills						
Predictors: (Constant), Science Literacy Ability						

Table 7 shows that the results of the analysis of variance are statistically very significant (0.000), indicating that the relationship between scientific literacy ability and science process skills of high school students in Makassar is very strong.

Table 8: Regression coefficient of correlation between scientific literacy ability and biological science process skills of high school students in Makassar.

Coefficient						
Model		Non-standard coefficient		Standard Coefficient	t	Signature.
		B	Std. Error	Beta		
1	(Constant)	18,889	3,633		5,199	,000
	science literacy skills	,415	,084	,484	4,943	,000

Dependent Variable: Science Process Skills

The B values of the two variables (scientific literacy and science process skills) are given in Table 8, and the constant is 18.889. It can be seen that the regression equation is $y = 14.889 + 0.415X1$.

Table 9 shows that R square is very high (0.234) indicating that the effective contribution of science literacy skills and students' science process skills is 23.4%.

Table 9: Summary of Regression of the Relationship between Science Literacy Ability and Biological Science Process Skills of SHS Students in Makassar City

Model Summary				
Model	R	R Square	Customized R Square	Std. Estimated Error
1	,484 a	,234	,224	9.42597
a. Predictors: (Constant), Science Literacy Ability				

4. Discussion

School literacy in the context of the school literacy movement is the ability to access, understand, and use things intelligently through various activities or activities,

including reading, viewing, listening, writing and or speaking [12]. Science Process Skills is a student's ability to apply the scientific method in understanding, developing, and discovering knowledge. The Science Process Skills Approach is a science process-oriented learning approach. Science Process Skills is very important for every student as a provision to use the scientific method in developing science and is expected to gain new knowledge or develop the knowledge already possessed [13], [14]. In the practicum-based learning process, science process skills will be produced because with science process skills students are expected to be able to observe, classify, interpret, predict, ask questions, formulate hypotheses, plan experiments, use tools and materials, apply concepts and communicate [15].

Based on the findings from the data above, it can be seen that scientific literacy has a very high contribution to students' science process skills simultaneously. Table 6 shows that R square is very high (0.218), indicating that the effective contribution of scientific literacy skills and science process skills of senior high school students in rural Jeneponto district is 21.8%. This also shows that the ability

of scientific literacy and science process skills is quite high. Then in table 9 it can be seen that the R square is very high (0.234) indicating that the effective contribution of science literacy skills and science process skills of high school students in Makassar is 23.4%.

If you look closely, the data on scientific literacy and science process skills in Makassar City and Jeneponto Regency is quite high because the effective contribution of both reaches more than 20 percent. Things that have not been counted that might make their effective contribution not maximal could be caused by several other variables that were not investigated such as learning motivation, interest in learning and so on. The data above also shows that the scientific literacy ability of students in Makassar City is higher than that of students in rural Jeneponto. Some of this could be due to factors that can make a significant difference between urban and rural areas.

Looking at the existing data shows that students' scientific literacy is still lacking. There are several factors that influence the low achievement of students' scientific literacy because (1) Students have never worked on scientific literacy questions before, thus making students feel awkward with questions that are different from those usually obtained at school. (2) The habit of students preferring to memorize learning material rather than understanding it, so that students do not understand and apply the material in everyday life. (3) The questions that are usually given by the teacher for evaluation are not analytical in nature, so they do not require students to use their reasoning. This resulted in students not accustomed to reasoning and critical thinking. (4) Students' lack of interest in reading and students' unfamiliarity in answering questions in the form of discourse, graphs, and pictures. In addition, from the observations of researchers, students do not like to read long questions, this is due to the low interest of students in reading. Scientific literacy is inseparable from students' interests and abilities in reading a text, because through reading students can understand the concept of a material [16], [17], [18].

Scientific literacy is the ability to understand scientific processes and obtain meaningful scientific information available in everyday life. Scientific literacy is an important and needed skill in today's digital era because many problems are related to knowledge and technology, as well as empowering people to make personal decisions and participate in the formulation of public policies that have an impact on their lives [18], [19].

In the educational process, science is a product that includes facts, concepts, principles, laws, and theories. The importance of scientific literacy for students. Students are expected to be able to meet various demands of the times, namely to become problem solvers with competitive, innovative, creative, collaborative, and character traits. This is because the mastery of scientific literacy skills can support the development and utilization of 21st century competencies. Based on PISA (Programme for International Student Assessment) data, Indonesian students' scientific literacy skills are still below the average when compared to the in-

ternational average score and generally are at the lowest measurement stage of PISA [19].

The low scientific literacy ability of students in Indonesia is caused by several factors. The learning environment and climate in schools affect variations in student literacy scores [19], [20]. Likewise, the state of school infrastructure, school human resources and the type of organization and school management have a very significant effect on student literacy achievement. In fact, everyone is expected to have a science process skills because it is very applicable in everyday life. Its application is not only within the scope of scientists / scientists but in a broad scope of application. The process of compiling ideas/concepts, investigating a problem, determining alternative solutions, and concluding the problem can be done by anyone. Therefore, science process skills needs to be owned by every student as a provision for life in the community.

Science process skills are important for students to have in scientific inquiry activities to solve various science problems. Science process skills are all abilities needed to acquire, develop, and apply scientific concepts, principles, laws, and theories in the form of mental, physical, and social abilities [18], [19], [20]. The facts that occur in the field of science learning are still relatively not touched on the development of science process skills optimally. The low level of science learning is due to the fact that the benchmark for the success of education in schools is still based on the concept. Science learning so far tends to only hone aspects of remembering and understanding, not training students' skills in inquiry. This situation is exacerbated by the condition where the focus of the presentation of learning is only done with lecture activities, resulting in very limited student activities while studying [19],[20]

The low science process skills ultimately lead to low student science learning outcomes. The results of the TIMSS (Trends in International Mathematics and Science Study) survey which measures scientific inquiry abilities, show that the average science achievement score of Indonesian students in 2011 shows relatively the same results, which is in the order of 39 out of 41. with an average score of 406 while the international average score has reached a score of 500 [21]. Based on the results of the interpretation of the TIMSS survey on the ability of Indonesian students in terms of cognitive aspects (knowing, applying, reasoning), it turns out that on average they are still in the ability to know. Based on the empirical data that has been stated above, it is necessary to make major and fundamental changes in the implementation of science learning. Various efforts must be made with the aim of improving learning that leads to improving the quality of learning processes and outcomes so that in the end they can prepare students for the future.

Regarding answering these problems, equal distribution of education is a solution to achieve quality education, so that it has an impact on the quality of competent, character, competitive and superior human resources, thus contributing to national development, benefiting the surrounding environment, encouraging the establishment of a democratic Indonesian society. and modern based on the values of Pancasila [22]. Conceptually, there are 2 concepts of equity, namely

active equity and passive equity. Passive equity is equity that places more emphasis on equal opportunities to enroll in schools, while active equity means equality in providing opportunities for enrolled students to obtain the highest learning outcomes. Of course, active equity in education needs to be implemented and realized because the importance of education is felt by all elements of society [23].

Education should have become a priority for all people in Indonesia. But education for the poor is like a luxury that they cannot buy and own. In fact, every citizen has the right to obtain the same educational services regardless of origin, religion, ethnicity, and region. However, the fact is that education in urban areas receives higher attention from the government than education in rural areas. Students in urban areas have superior verbal and numerical thinking skills compared to students in rural areas and the quality of schools in rural areas is generally low and schools in growing rural areas have challenges and opportunities, especially the emergence of new schools. In rural schools teacher absenteeism is relatively low and the focus is on teaching standards set. Many things can cause urban and rural education gaps, some of which are caused by inadequate facilities and infrastructure as well as the quality of teachers [23], [24].

The limited facilities and infrastructure in schools is one of the obstacles causing the difficulty of progress or development of the quality of human resources. In Indonesia, with its very limited and even deprived conditions, students, especially in rural schools, cannot experience facilities as good as schools in cities. For example, in terms of adequate computer laboratories, good benches and desks, cool study rooms, internet facilities and sports facilities, these are all rare items for schools in the village [25], [26].

The gap in facilities and standards of rural and urban schools, seems to be left unchecked by the government, even though schools, especially public schools and students from villages, must receive the same treatment. Another factor that causes students in urban areas to be superior to students in rural areas is the inability of villages to deal with the rapid progress of the city, one of which is caused by the weakness of the education system in the village itself [26], [27]. Often the development of education implemented in village schools is not adjusted in advance to the needs that exist in the community. Even more concerning in curriculum preparation is sometimes equated with curriculum development in city schools. This then makes it impossible for schools in rural areas to be able to respond to the challenges and job opportunities that exist in their own area. Finally, there is a tendency that if there is an educated village child, he will be reluctant to work in his village and then prefer to go to look for more promising jobs to the city. Furthermore, socio-economic status, family background, distance from home from school, school conditions, availability of academic resources, teacher qualifications, teaching strategies, student self-concept, student perceptions of school safety and parental and community support are difficult to understand. resolved [27], [28], [29].

Equitable education is a solution to realizing quality education, so that it has an impact on the quality of Indonesian human resources who are competent, characterized, com-

petitive and superior, thus contributing to national development, benefiting the surrounding environment, encouraging the realization of a democratic and modern Indonesian society [29], [30]. Every citizen has the right to obtain the same educational services regardless of origin, religion, ethnicity, and region. But the fact is that education in urban areas receives higher attention from the government than education in rural areas. Students in urban areas have superior verbal and numerical thinking skills compared to students in rural areas and the quality of rural schools is generally low and rural schools that grow and develop have challenges and opportunities, especially the emergence of new schools. However, rural schools have relatively low teacher absenteeism and focus on teaching of established standards [31]. The urban-rural education gap is caused by facilities and infrastructure, and the quality of teachers [32], [33]. Many factors cause students in urban areas to be superior to students in rural areas, including socioeconomic status [34], [35], family background, distance from home from school, class and school size, school conditions and availability of academic resources, qualification of teacher, teaching strategies, students' self-concept, students' perceptions of school safety and parental and community support [36].

Seeing the importance of fulfilling education equality in Indonesia, of course this must be done given serious attention in solving the problems of the Indonesian education system. There needs to be a solution that can overcome educational problems that then exist, especially in terms of equitable distribution of education, because equal distribution of education will be directly proportional to the increase in student learning outcomes throughout the region.

5. Conclusion

Scientific literacy and biological science process skills have a big contribution to student learning outcomes. The data were analysis using simple regression analysis. The result of study showed that science literacy was contributed to biological science process skill as many as 25,8% (in rural area as many as 21,8, and in urban area as many as 23,4%). However, there is a difference in the value of the contribution between urban areas and rural areas, so there is a need for an equal distribution of education in several areas.

6. Confession

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Author Profile



Muh. Ilham Sakri is a graduate student, Biology Education Study Program, Universitas Negeri Makassar., Indonesia. She also research concerns on scientific literacy and science process skills



Arsad Bahri is a lecturer at the Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Indonesia. His research interests include biology education, critical thinking, metacognitive skills, and student attitudes.