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THE IMPLEMENTATION OF SCHOOL-LITERACY-MOVEMENT: INTEGRATING SCIENTIFIC LITERACY, CHARACTER, AND HOTS IN SCIENCE LEARNING

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ABSTRACT

This study aimed to examine the implementation of the School Literacy Movement by observing its impacts toward the scientific literacy, characters, and HOTS of Grade VII Junior High School (JHS) students in Pekanbaru within the context of K-13. The survey was conducted with 45 natural science teachers on the basis that they have integrated K-13 into thei r teaching and learning. The data of SLM implementation was obtained from the teacher by means of questionnaires and observation which was conducted in science classes in three JHS in pollution and global warming topics. The results showed that 49.13% activities were successfully implemented by SLM. The results showed that students' scientific literacy in the three schools were 69.5%, 76.3%, and 75.2%. Meanwhile, the character values have reached 80.6%, 76.4%, 72.9%, and students' HOTS values were 73.0%, 72.5%, and 73.3%. Based on the survey, it can be concluded that although the school has pioneered SLM, the strengthening of scientific literacy, characters, and HOTS has not been executed by all teachers who implement K-13 due to various obstacles need new policies to assess the execution of the SLM program by local education department.

Keywords: *Characters, HOTS, scientific literacy, school-literacy-movement*

INTRODUCTION

Indonesia is a cultured nation that strongly upholds noble characters, values, and local wisdom (Putra & Hasanah, 2018; Roza, Sulistyaningtyas, Munaf, Jatnika, & Suryani, 2016). To build a cultured nation that embodies the value of religion, honesty, tolerance, discipline, creativity, independence, democracy, curiosity, communication, peace, reading, social care, integrity, caring for the environment, and respecting achievement requires character strengthening. It is a shared responsibility of the family, education institutions and community. (Presidential-Regulation, 2017). Based on this consideration, it is necessary to stipulate a Presidential Decree on Strengthening Character Education.

The goal of Strengthening Character Education (or *Penguatan Pendidikan Karakter-PPK*) is to build and equip students as the Indonesian golden generation in 2045 with the spirit of Pancasila to deal with the world's dynamics in the future, develop a national education platform that emphasize character education as its soul in the undertaking of education for students with public supports through formal, non-formal and informal education. It also needs to take into account the diversity of Indonesian cultures in order to revitalize and strengthen the competencies of educators, education personnels, students, communities and family environment in implementing *PPK* (Presidential-Regulation, 2017). The conclusion of *PKK's* objectives is that character education plays an incredibly important role in the learning process.

The *School Literacy Movement* (or *Gerakan Literasi Sekolah*) program initiated by the current government was developed based on nine priority agendas (*Nawa cita*) related to the tasks and functions of the Ministry of Education and Culture. The points of *Nawa cita* that relate to education sector include numbers 5, 6, 8, and 9. What is meant by school literacy in the context of SLM is the ability to access, understand, or do various

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activities including reading, seeing, listening, writing, and/or talking. SLM is an effort that is carried out in a comprehensive and sustainable way to make the school the centre of learning whose members are literate through public involvement (S. Utomo, 2017). Literacy program integrated into the curriculum through habituation in learning is the responsibility of all teachers (Kemendikbud, 2016). But until 2018, the SLM launched by the Ministry of Education and Culture could not be implemented in all schools. Because each school has different facilities and faces different conditions, which necessitates in-depth research on the implementation of SLM.

Interviews with science teachers at natural science teacher forum provided some information that although *Kurikulum Tahun 2013* (*K-13* or Curriculum 2013) and SLM have been implemented since 2016, there still have been some issues in the implementation. One of the biggest challenges was the learning design that could facilitate the students to be skillful in problem solving, evaluating and designing scientific research, drawing conclusion from the evident and applying the science into their real life. This fact was evident from the students' low proficiency in solving the problems related to the scientific phenomena in their life.

The assessment standards of *K-13* curriculum require teachers to carry out learning and assessment in a way that encourages students to think critically or to have higher-order thinking skills (HOTS). HOTS involves complex judging skills including critical thinking and problem-solving abilities. The learning strategies and tools developed by teachers in school must be principally based on the mentioned criteria. Although there have been many studies about HOTS, its implementation in class is not yet optimal, especially when it is related to the achievement of students' competencies expected in the curriculum. This study was conducted to find out the implementation of the SLM program in strengthening literacy, characters and HOTS by teachers of natural science subject in Grade VII of JHS in Pekanbaru Riau.

METHOD

The survey was conducted in JHS of Pekanbaru from April to July 2018. The population in this study was natural science teachers in public and private schools, of which 45 individuals teaching the seventh grade were chosen as the sample as they have implemented *K-13* and actively participated in natural science teacher forum. Primary data were obtained from closed and opened questionnaires. While the researcher also examined the documentation of teaching material at JHS Future Islamic School (FIS), JHS 17, and JHS 25. on the subject of environmental pollution and global warming.

Information on the implementation of SLM was collected through questionnaires and observations. The closed questionnaire was to measure the implementation of literacy, character integration, and HOTS by the teacher in learning. Alpha Cronbach's reliability value of the questionnaire (0.93) is valid with r table of 0.53 with a significant level of 5% which is processed using SPSS 18.00 for windows. Meanwhile, information on the implementation of *K-13* based learning and the strengthening of scientific literacy, characters and HOTS were obtained through observation. The focus of observation was on the science literacy in JHS FIS, character in JHS 17 and HOTS in JHS 25. The data resulted from observation were analyzed descriptively on a scale of 1-4.

RESULTS AND DISCUSSION

Implementation of school literacy movement (SLM) by JHS natural science teachers

The researcher did surveys and observed the implementation of SLM in *MGMP IPA* having 45 members. The profiles of teachers carrying out SLM and its implementation are explained in Tables 1, 2, 3, 4, and 5.

Table 1. Teachers' educational background

Degree	Specialization				Total (%)
	Biology education	Physics education	Chemistry education	Others	
S1	35(77)	5(12)	3(7)	2(5)	43(96)
S2	2(4)	-	-	-	2(4)
Total (%)	37(81)	5(12)	3(7)	2(5)	**45(100)**

Table 2. Teachers' profiles based on gender and training experience

Gender	Training		Percentage (%)
	Once or more	Never	
Female	11(24.4)	28(62.2)	39(86.7)
Male	4(8.9)	2(4.4)	6(13.3)
Total (%)	15(33.3)	30(66.7)	**45(100)**

Table 3. Teachers' profiles based on teaching experience, certification, and employment status

Teaching Experience	Certification		Employment Status		Total (%)
	Yes	Not	Civil Servant	Non Civil Servant	
1-5 years	2(4.4)	5(11.1)	2(4.4)	5(11.1)	7(15.6)
6-10 years	4(8.9)	2(4.4)	4(8.9)	2(4.4)	6(13.3)
11-15 years	17(37.8)	4(8.9)	17(37.8)	4(8.9)	21(46.6)
16-20 years	3(6.7)	1(2.2)	2(4.4)	2(4.4)	4(8.9)
20 years	6(13.3)	1(2.2)	5(11.1)	2(4.4)	7(15.6)
Total (%)	32(71.1)	13(28.9)	30(66.7)	15(33.3)	**45(100)**

Table 4. Percentages of SLM implementation by teachers in JHS Pekanbaru

Points	Percentages of answer (%)	
	Yes	No
Fifteen minutes activities have been entrenched and become the needs of school members	40 (88.8)	5 (11.2)
Follow-up activities in the form of oral or written responses	26 (57.7)	19 (42.3)
Development of various reading strategies following the emergence of literacy culture	23 (51.1)	22 (48.9)
Students use physical, social, and academic environments with a variety of non-textbooks readings to enrich knowledge about given subjects	30 (66.6)	15 (33.4)
The teacher becomes a model in the activity of reading non-academic books by reading the selected books that have been read by students.	22 (48.8)	23 (51.2)
The teacher applies various strategies to understand texts in all subjects	24 (53.3)	21 (46.7)
Average (%)	**61.05**	**38.95**

Table 5. Percentages of SLM implementation by schools

Points	Percentages of answer (%)	
	Yes	No
Schools attempt to involve public to develop school literacy activities	17 (37.7)	28 (62.3)
Academic activities that support the culture of school literacy	24 (53.3)	21 (46.7)
Regular awards for students' achievement in literacy activities	14 (31.1)	31 (68.9)
Celebrating literacy-related days	16 (35.5)	29 (64.5)
Showcasing original works (results from critical thinking and the ability to communicate ideas verbally, visually, digitally, or in writing) in celebration of literacy-related days	16 (35.5)	29 (64.5)
Establishing the School Literacy Team	19 (42.2)	26 (57.8)
The School Literacy Team is assigned to plan, implement, and assess school literacy programs	16 (35.5)	29 (64.5)
The school principal and his staff are committed to implementing and supporting the school literacy movement	32 (71.1)	13 (28.9)
Schools connect with external parties to develop school literacy programs and professional development for school members in literacy	13 (28.8)	32 (71.2)
Average (%)	**41.19**	**58.81**

Data in Table 4 shows that the average implementation of SLM by teachers is 61.05% and the percentage of teachers who have not implemented is 38.95%. Fifteen minutes of reading activities before the lesson starts have been carried out (88.8%), but they are still in routine activities. Follow-up activities, development of reading strategies, utilization of the physical, social and physical environment, teachers as models in reading non-learning activities are still low. The results of interviews with several teachers who have not yet implemented the SLM show that teachers are still limited to overseeing literacy activities and have not actively participated in becoming models in reading literacy activities. In addition, teachers face various obstacles in carrying out all SLM activities because teachers feel that they have less time to add their insights because teaching and administrative activities have taken a lot of their time.

The implementation of SLM by schools is also still low. Not many schools have involved the public in developing the SLM programs and in building networks with external parties. The designated school literacy team has not carried out its role optimally. The appointed member of school literacy team is usually a permanent teacher of Bahasa Indonesia and English subjects. The results of the observations indicate that the school has not empowered non-permanent teachers on duty at the school. It is better if the headmaster can empower the potential of junior teachers.

The implementation of SLM by teachers was conducted before the class starts on Tuesday to Thursday at 7.30 to 7.45; After reading the Holy Quran (*Tadarus)* and singing national anthem of Indonesia (*Indonesia Raya*) during ceremony. During Class: At the beginning of the class, in the middle of the class, and after the class ends. Follow-up activities: (1). Students take turns reading the Holy Quran; (2). Students summarize the contents of their reading, retell what they read, give comments to one another, conclude the contents of the reading in front of the class, convey their impressions and suggestions to improve future learning procedures, practice Arabic and English, make written responses. The literacy activities are displayed once a month in the fourth week of each month coordinated by teachers of Bahasa Indonesia. Strategies that integrate literacy into lesson plans, reading corners, wall magazine, internet, and mini-libraries in classes such as reading before starting class; self-study on the reading terrace; making a review; observing the environment and reporting its results, storytelling and writing poetry.

Another activity is that students read novels, short stories, comics, fairy tales, and non-academic story books chosen by teachers of Bahasa Indonesia, encyclopedia, story books, formula books, science books, history, autobiography, religious books and folklore, fiction, popular, and scientific books entrepreneurship books such as agriculture and fisheries. The history of Islamic Holy Prophet through posters, wall magazines and reading corners, carrying out activities in an environment in accordance with a particular subject lesson, newspapers, magazines and electronic sources (internet).

Non-academic books exemplified by the teacher include popular books, fiction, encyclopedias, health, pictures and videos, books on animals, plants, the history of Holy Prophets, and universe knowledge. In the break time or when the teacher is absent, students are directed to read books related to a particular subject in the library and asked to make a summary of the reading. Other activities include completing crossword puzzles, searching for essence and observing images, reading more than one book.

The implementation of SLM by Schools. Schools collaborate with Mobile Libraries from local libraries (*Soeman HS* Library), education office, language centers, *Riau TV*, *TVRI*, newspapers, teachers from other schools having more teaching materials and experience, school committees, parents and society. Academic activities supporting school literacy culture include reading 15 minutes before class begins, English Day activities such as storytelling, writing scientific papers, literary competitions (reading poetry and speech), reading and memorizing *Hadith Arbain*, reading in the mobile library/school library and classes, books lovers activities every month written on children's portfolios.

Assessment the implementation of SLM integrated by school activities likewise national celebration days and religious holidays. The kaind of the activities that can be conducted are students exibtion, reading and *pantun* competition, making videos, class presentations, reading the Holy Quran, the performances of arts, speeches, reports, singing

national songs, reading a portfolio once a month, wall magazines, and scientific paper competition.

The school literacy team consists of school principals, Indonesian language teachers, libraries staff, English teachers, Counselling teachers, teachers of other subjects, and teachers appointed by the school principal and student council. The job of the literacy team includes planning, implementing and assessing the literacy programs in school. The first stage of planning is to set a schedule for literacy activities, identify reading materials, make a reading corner, and add a collection of books. After that, the team works to cultivate the culture of reading, making a synopsis and conclusions from the books, reading and exchanging books among students. For the assessment stage, the team conducts competitions (reading poetry, making school and class wall magazines every month with predetermined themes, and fastest reader competition) followed by the handing of gifts and another follow-up literary activities by students.

School commitment in supporting the school literacy movement includes providing daily time for literacy activities, implementing already-designed programs, giving rewards to those who have read the most with quick understanding, conducting coaching, adding a collection of books in the library, giving freedom and support in class hours, giving very class a reading corner with obligatory reading policy before class, providing reading books, library visits, student studio, routine control, and monitoring. Schools connect with external parties including mobile libraries from local governmental library office, language centers, literacy forums, school staff, *RRI Pekanbaru*, parents and printing companies.

The data on SLM implementation in Pekanbaru showed that not all activities in school literacy activities were carried out properly. This is due to various obstacles, one of which is the availability of reading material in schools. The results of interviews with a number of teachers in junior high schools demonstrated a need for teachers to select relevant reading material for students, in addition to that teachers are expected to be able to write books through *Satu Guru Satu Buku* movement *(SAGUSABU)* or One Teacher One Book. Teachers are always motivated to write so as to produce books to support the literacy movement.

Learning observation in the implementation of K-13 and SLM

Learning observations took place in JHS FIS, JHS 17 and JHS 25 Pekanbaru in 2017/2018 school year with a total of 101 students. Observations were carried out simultaneously while the teacher were implementing teaching and learning process on the topics environmental pollution topics and the lesson global warming.

To see improvement in character, scientific literacy, and HOTS in natural science subject, the researcher did observations on those 3 aspects.

Students' scientific literacy at JHS Future Islamic School Pekanbaru

In the learning process, scientific literacy can be measured from several indicators as outlined in the observation sheet. The comparison of the students' average scientific literacy grade in topics environmental pollution topicscan be seen in Table 6

Table 6. Students' Scientific Literacy in JHS FIS

Indicators	Topics (%)	
	I	II
Doing literature research	76.7	69.0
Reading and interpreting pictures/data	71.7	68.5
Identifying Scientific Arguments	66.5	68.5
Presenting Conclusions and Predictions	66.7	66.5
Average	**70.4**	**68.6**

The average score of scientific literacy was 70.4% in enviromental pollution and 68.6% in global warming topics. Scientific literacy skills can be further enhanced by encouraging students to continually search the literature, read and interpret data/images, identify scientific arguments, and present conclusions and predictions. A couple of ways done to improve scientific literacy were observations student activity and reading 15 minutes before the lesson starts.

The results of this study are in line with Mansyur, Rahamma, and Fatima, (2013) in that it shows an increase in students' ability to read and understand material about communication information technology presented by the

teacher in visual form along with complete facilities and variety of visual presentations displayed by the teacher as well as learning strategies in ICT learning. The work of Faradina (2017) also shows the significant influence of the SLM Program on students' reading interest with T value reaching (7.332)> t-table (1.657).

According to Derlina and Srijayanti (2016) there is a positive relationship between higher-order thinking skills and the level of intelligence simultaneously with scientific literacy skills ofjunior high school students with a correlation coefficient of 0.350. The results of research by Istikomayanti, Suwono, and Irawati (2016) about the development of tools (syllabus, lesson plans, modules, and assessment instruments) that can improve students' environmental literacy include the aspects of knowledge, attitudes, and skills and habituation. Windyariani and Sutisnawati (2017) requires the existence of contextual learning integrated with practical learning to instill concepts that match scientific literacy abilities. Furthermore, according to Lederman, Lederman, and Antink (2013) the main priority in the reform of science education is to enhance scientific literacy since such literacy helps students solve problems and make personal and social decisions. In this regard, the teacher plays a role to facilitate students to think holistically.

The strengthening of students' characters in JHS 17 Pekanbaru

The students' character was assessed from each indicator from the observation sheet carried out during the learning process. The grade for the character assessment was given by Ernawati. The comparison of the students' average grade for character assessment in topics I and topics II can be seen in Table 7.

Table 7. The assessment of students' character in Topics I and II

Assessed Characters	Topics (%)	
	I	II
Religious	80.0	85.7
Nationalist	73.5	71.5
Independent	73.0	76.2
Mutual Cooperation	80.5	80.2
Integrity	68.7	71.7
Average	**75.1**	**77.1**

The data in Table 7 shows that after the implementation of learning process using the *Problem-Based Learning* model, the grade of students' character in topics I averaged 75.1%, and this increased to 77.1% in topics II. This increase occured in every indicator, namely religious, nationalist, independent, mutual cooperation and integrity. Integrity grade in topics I and topics II, however, was lower than that of others. It is therefore necessary to improve learning activities so as to enhance students' character.

Derlina and Srijayanti (2016) contend that the values of character education closely related to oneself are an important factor in the implementation of character education. Furthermore, according to Setyaningrum and Husamah (2011) character education can be introduced to students through all subjects, one of which is Biology. Biology teaching and learning is believed to support character education. This is in line with Maunah (2014) which concluded that the overall process of character education led to good results with an average grade of understanding, using the same standard of assessment, reaching 78.

The critical thinking ability of students at JHS 25 Pekanbaru

The observation conducted at JHS 25 Pekanbaru aimed to see the strengthening of HOTS in learning of natural science by assessing students' critical and creative thinking skills.

Critical thinking

The students' average grade for critical thinking assessment in topics I and topics II after surveys are outlined in Table 8.

Table 8. Students' critical thinking abilities in topics I and topics II

Assessment Points	Topics (%)	
	I	II
Analyzing	75.0	88.2
Synthesizing	59.0	70.5
Collecting data	65.0	84.5
Solving Problem	67.2	67.2
Assessing	64.7	83.2
Average	**66.2**	**78.7**

Based on Table 8, the students' average critical thinking grade increased from 66.2% in topics I to 78.7% in topics II. This increase may result from to the fact that students are able to

find concept of the activities facilitated in *Problem-Based Learning* model such as presentation activities so that students manage to analyze and synthesize the lessons and prepare themselves before taking the upcoming tests. This can be seen when the teacher asked "Have you ever seen and noticed the environmental conditions above?", "What distinguishes the two images?" This activity will facilitate students to analyze. Then students were asked to present as many questions as possible related to the results of observations and their reading. Examples of questions made by students "Why can air and soil be polluted?", "What happens if the soil and air are polluted? ", "What are the factors that can cause polluted air and soil?"

According to Setyawan (2017), critical thinking can be improved through the OIDDE (Orientation, Identify, Discussion, Decision, and Engage in behavior) learning model. Her study concluded a mean score of 72.9% (Good category) which includes 10 indicators of critical thinking skills, namely Goals (76.1%), Problems (70.5%), Addressing problems (72.8%), Points of view (69.4%), Information (75.5%), Concepts (78.8%), Assumptions (72.6%), Alternative solutions (67.9%), Interpretations (75.5 %), and Implications (70.7%). Mitasari and Prasetiyo, (2016) also concluded that discussion-presentation methods combined with critical analysis of articles through lesson study can potentially improve students' critical thinking ability as shown by 15% grade increase from Cycle I to Cycle II and 3.4% from Cycle II to Cycle III.

The study of Wilsa, Susilowati, & Rahayu (2017) also supports the findings of this research. He argued that the application of Problem-Based Learning model based on SSI had a substantial influence on the development of critical thinking skills, written and verbal communication and cognitive learning outcomes. This is also supported by Rahayuni (2016) saying that there is a fairly strong correlation between critical thinking skills and scientific literacy with the number of correlation coefficients or r = 0.463.

Creative thinking

Creative thinking was the other assessment done along with that of critical thinking during the survey. The students' average grade for creative thinking assessment in topics I and topics II are outlined in Table 9.

Table 9. Students' creative thinking abilities in topics I and II in natural science learning

Assessed Points	Topics (%)	
	I	II
Fluency	72.5	86.2
Flexibility	66.2	81.5
Originality	62.0	74.2
Elaboration	63.7	86.0
Average	**66.1**	**82.0**

Table 9 shows the students' average creative thinking grade in topics I was 66.1% and it increased to 82.0% in topics II. The students' activities in the Problem-Based Learing process, especially at the problem-solving stage, significantly influence on creative thinking skills since students are required to provide solutions to a problem discussed during the learning process as shown in Table 6. This can be seen when students actively seek information to prove that the environment can be polluted, what happens if the environment is polluted and analyzes the factors that can cause water pollution. Khoiriyah and Husamah (2018) show that teachers can apply Problem Based Learning to improve students' creative thinking and problem-solving skills as well as learning outcomes. This is consistent with their previous research that conclude Problem-Based Learning improved problem-solving skills up to 27% on average with a completion rate of 47%, average creative thinking skills up to 11% with a completion rate of 17.5%, and learning up to 13% with a completion rate of 15%.

Suparman and Husen (2016) also concluded that the application of *Problem-Based Learning* models can improve the ability of creative thinking and students' learning outcomes with the grade of creative thinking in the first cycle reaching 12.9 (Creative category) and this increased to 15.1 (very creative category).

Profile of Scientific Literacy, Character, and HOTS JHS in natural science learning

The results of surveys conducted in JHS FIS, JHS 17 and JHS 25 Pekanbaru are shown in Figure 1. The results of the study show that students' scientific literacy (69.5, 76.3, and 75.2), character (80.6, 76.4, and 72.9) and HOTS (73.0, 72.5, and 73.3,) on environmental pollution and global warming lesson. At the beginning of the lessons teachers orient students to the problem by watching videos about garbage, household and factory waste. Students

are then led to sort out problems, make hypotheses, find solutions, provide results and discuss problems. This kind of learning activity can be used to develop reading literacy to interpret data, predict and make an inference. The group discussion activities will contribute to the students' character development and the spirit of teamwork that will be very beneficial for their lives in the future. According Chiappetta and Koballa, (2010) teacher must help student develop an appreciation for science and engineering and understanding of the nature of those discipline both to enhance their decision- making abilities and to ready them for college and careers.

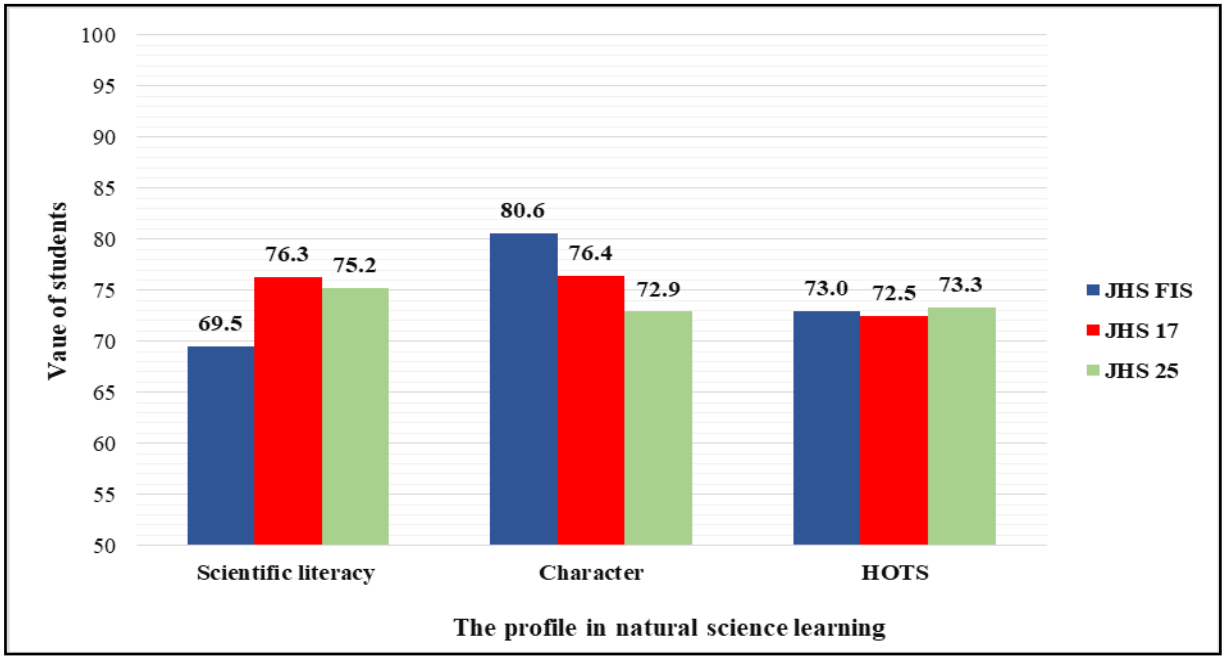

Figure 1. Profile of scientific literacy, character, and HOTS in natural science learning

The reading activity, 15 minutes before class needs to be improved in this regard. Furthermore, teachers should provide reading material related to the lesson so that students are expected to be more motivated. In fact, teachers haven't supplied enough supporting reading material. It is therefore important for teachers to give more variety of learning resources. The resources can be in the form of pocket books, posters, student work sheets, and others. For instance, Suryawati, Hamzah, and Hayati (2015) developed worksheets through *Ayo Berkarya, Ayo Bereksperimen* (Let's Try, Think Big) that was proven to improve students' critical thinking. According to the Kemendikbud (2016) SLM will succeed if it is supported by all elements collaboratively. Character integration is an educational movement under the responsibility of educational units (schools) to strengthen the character of students through harmonization of hearts, thoughts, and sports with involvement and collaboration between schools, families and communities as part of the National Movement of Mental Revolution. One of the possible efforts to do is to set literacy-friendly physical environment, for example, by providing reading corners in all classes, offices and other areas of the school.

CONCLUSION

Based on the results of the study, it can be concluded that SLM has been implemented by Natural Science Teachers (61.05%) and schools (41.19%) with various activities. Science teachers have carried out improved learning through classroom action research to improve scientific literacy, strengthen character and HOTS for students at JHS FIS, JHS 17, and JHS 25. It is hoped that SLM can be implemented by all teachers collaboratively through school-based lesson study and Natural Science Teacher Forum based lesson study.

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