Science Teacher Understanding to Science Process Skills and Implications for Science Learning at Junior High School (Case Study in Jambi)

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Abstract: ***One of learning objectives in the school to develop students science process skills (KPS). KPS development meant that students were able to develop science and success in his future life. However, KPS development of students at junior high schools in Jambi has not been optimal, this is presumably because still lack a science teacher understanding to KPS. Therefore, the research aims to examine as far as science teacher understanding at senior high school in Jambi to KPS. Total of 32 science teachers tested and interviewed. Test results and interview showed that science teacher understanding to KPS still low. This is indicated by test scores only reached 63.44. One of solution offered was need to be teaching material development to direct and train science teachers in student KPS development.***

Keywords: KPS understanding, science teacher, implication

1. Introduction

Science lesson is very important to be taught at school and mastered by students. The importance of science lesson at school not only science was too central in the world technology development but also play a part in establishment of student scientific attitude, improve problem-solving skills, provide better job opportunities and also role in development of society cultural. This is also confirmed in Permendiknas No. 26 of 2006 about Standar Isi for SD/MI and SMP/MTs, states that *"... science education has expected to be a vehicle for students to learn about themselves and environment, as well as prospects for further development in applying it in daily life ..."*.

Moreover, according to Prakash (2011:1), science learning in schools has several objectives, namely to; introduces studentswith natural phenomena in their environment, introduces students with an outline the great scientific principles, prepare students to make a living through certain professions such as doctors, agricultural workers, engineers, and others in accordance with desire, to assist students in solving problems in daily life, stimulate students to ask about things that they do not know and want to know, develop a good attitude and responsible, ensure that students understand the scientific method and to help students to think properly about science in relation to other subjects, introduce students about methods and system science and developing thinking patterns, developing students character through attitudes development, thinking habits, feeling, acting, curiosity, caution, curiosity that leads to a correct observation, and dare to admit that "I do not know."

In order for science learning purpose achieved in school, science teachers should be able to understand science characteristics properly. Understanding to science lessons character meant that teachers can prepare, implement, and evaluate science learning better. In addition, with an understanding about a good science character also possible for science teachers to be able to pick and choose methods and resources learning which are precise and accurate. Therefore all science teachers need continue to develop insights and try to understand science lessons character thoroughly.

One of science character needs to be known and dominated by science teacher is science as a process. Science as a process means that to discover and understand a facts, concepts, principles and nature laws necessary means and measures systematically. Ways and measures themselves in science can be done by universe exploring and relation with human life. Therefore science learning should provide adequate space for students to explore to the surrounding environment.

To be able to explore the universe and relations with humans, science learning should be positioned nature as main object study. Thus science learning should provide opportunities and allow students direct contact with nature or environmental studies. Science learning by explore the nature around are expected to be more interesting and meaningful for students. Interesting in the sense that students will be in contact directly with object studies that is their surrounding environment. This way allows students to think and act as a scientist. This means that students will more easily connection between nature with human life, thus they were able to take a role in preservation and environment exploration for a better life. In other words, science learning by explore and assess natural environment around the student directly is a very important thing in science learning at junior high school. This was stated by Carin (1993:4) *"... Leading*

children to explore and describe the things that surround them is an important goal of elementary and middle school science...".

To be able to explore the environment with a good one (students) must have a special set of skills. The skill known as science process skills (KPS). KPS signification usually refers to skill or ability to be possessed by scientist on scientific discovery process. These skills are divided into two basic groups: basic KPS (KPSD) which includes; observing, classifying, measuring, predicting and communication. Second group is integration KPS (KPST) which includes; identify and define variables, collect and transform data, create data tables and graphs, describing relationship between variables, interpreting data, manipulating materials, recording data, formulating hypotheses, designing investigations, make inferences and generalizations (Karamustafaoğlu: 2011; 1).

Referring to above information, it can be understood that KPS as an approach in science teaching is very important because it fosters direct experience. Direct experience can be gained through observation and direct contact with surrounding nature as its study object. Science learning by environmentobserve directly also gives a very positive impact for students. It was mentioned by Carin (1993: 5) that:
"...observations can stimulate the formation of new concepts; theories and accumulated knowledge can motivate the quest for new facts. Observations are empirical experiences in search of understanding; theories are tentative understandings in search of further empirical confirmation...".

Science process skills (KPS) is a skill that is needed by the students, not only in learning science but in their life. Research shows that KPS was instrumental in human success including student. Rubin (1992, 715) say that "... that people who are proficient in science process skills are not only better scientists but better citizens...". Then Ostlund (1992, 2) also says that "...science process skills are the building blocks of thinking and inquiry in science..". The same thing also expressed by Rillero (Keil, Jodi Haney, (2009:5), namely: "...Science process skills are not only important for those pursuing careers in science, but most jobs in this new millennium involve using these skills....".

Research and students KPS development theory had been stout conducted by experts, for example by; (Fouls and Rowe (1996), Ango (2002), Dirk et al (2006), Kagan et al (2006), Teo et al (2007), Nurochmah (2007), Feyzioglu (2009), Keil and Jennifer (2009), Karamustafaoglu (2011), Hidayati (2012), Septian (2012), dan Dini (2012). Out of researches have been found various models and learning strategy which allows student KPS development.

Facts on the ground research indicated that has been conducted by experts has not been fully able to student KPS developing. This is shown by research conducted by Olufunminiyi, AA, and Afolabi, F. (2010) who stated that student KPS at junior high school in Nigeria still relatively low, namely; manipulation capabilities (17:20%), counting (14:20%), data record (13.60%), observation (12.00%) and communication (11:40%). In addition, research conducted by Efendi (2010), also showed that Indonesian students skills in TIMSS associated with KPS, that are: (i) demonstrate knowledge about tools, methods, and procedures (= Knowing) (40.37); (ii) apply the knowledge to conduct scientific investigations (= Applying) (36.96); below the international average of 43.40.

Conditions as described above has raised important questions and needed a study to answer correctly. The question is "why research to development various learning models that are claimed to improve student KPS not followed by an increase KPS students? ". The low KPS students certainly influenced by many factors. Should be assumed that one of factor are understanding and science teachers ability to KPS, so any form of learning models that have been designed by experts to increasing student KPS can not be realized properly. Therefore need to be carried out a study to view and analyze the extent of science teachers understanding to KPS. Thus, this study aims to examine the extent of science teachers understanding to KPS.

2. Method

Teacher understanding to KPS very important and decisive in developing student KPS. Science teachers who have a good understanding of KPS will tend to be more capable in developing student KPS than teachers who have little knowledge about KPS. To see how far a science teacher understanding of KPS, the study conducted a test to science teachers at senior high school in Jambi.

Test were given to science teachers at senior high school is a test basic KPS understanding which include: observation, classification, inference, and measure. Test questions used by 20 questions were thatquize developed and made adaptations as necessary. The question then given to science teachers in Jambi at random. Scores obtained will be multiplied by 5 (five), so the maximum score of 100 and a minimum score of 0. The final score obtained by the science teacher will show the percentage of science teachers KPS understanding. The same questions will be used to student KPS test. It is intended to compare the score of KPS students and science teachers.

In addition by test, interviews are also conducted to ensure that respondent has provided accurate data. The point is science process skills test results of teacher junior high school has been accordance with KPS understanding held by science teachers. Interview questions related to how far science teachers know, understand, teach and KPS evaluate to student when science learning. The data obtained will be analyzed descriptively to describe the extent science teacher KPS understanding in Jambi.

3. Result and Discussion

Science Teacher Understanding to Science Process Skills (KPS)

Research conducted in Jambi to 32 science teachers who were tested randomly generate such data in the table 1.1 below:

Table 1.1

No.	*Teacher Code*	*SPS Score*	*Constanta*	*Total Score*
1	A	16	5	80
2	B	12	5	60
3	C	11	5	55
4	D	13	5	65
5	E	8	5	40
6	F	12	5	60
7	G	7	5	35
8	H	10	5	50
9	I	11	5	55
10	J	17	5	85
11	K	8	5	40
12	L	18	5	90
13	M	7	5	35
14	N	11	5	55
15	O	12	5	60
16	P	14	5	70
17	Q	11	5	55
18	R	17	5	85
19	S	9	5	45
20	T	11	5	55
21	U	13	5	65
22	V	11	5	55
23	W	10	5	50
24	X	16	5	80
25	Y	10	5	50
26	Z	16	5	80
27	A1	11	5	55
28	B1	16	5	80
29	C1	14	5	70
30	D1	12	5	60
31	E1	11	5	55
32	F1	15	5	75
Total		390	5	1950
Mean			5	60,94

Based on Table 1.1. above, it can be seen that average score science teacher KPS at junior high school 60.94 with a score range of 0 to 100. It is means that science teachers in Jambi able to answer 60.94% of 20 questions given or approximately 12-13 questions. The data showed that science teacher KPS at junior high school in Jambi still relatively low and need to be improved.

Total of 32 respondents, only 26 respondents interviewed. From interviews conducted on 26 respondents related to their understanding about KPS also produce data match that is science teacher KPS understanding still low. Respondents answers to interview questions are the following:

1. Are you (science teacher) ever heard the term science process skills (KPS)?. Approximately 27% or 7 science teachers said ever, while 73% or 19 people never heard.
2. Have you ever heard scientific method?. 100% of teachers answered ever.
3. Did you ever teach KPS or scientific method to students?. Approximately 85% or 22 people ever, 15% or 4 never.
4. Have you ever been taught using KPS approach or scientific method?. About 7.7% or 2 people ever and 92.3% or 24 people never.
5. Do you know how evaluate or assess KPS ability or scientific method owned by students?. About 7.7% or 2 people know and 92.3 people do not know.

From the data interview above can be seen that most or approximately 73% of science teachers have never heard KPS terms and only 27% percent who said they ever heard. But when asked about scientific method all science teachers ever heard. If understood both of term that are KPS and scientific method has the same substance. This is show that science teachers insight to KPS still low. Upon closer examination turns out there was a relationship with teacher education qualification concerned.

Associated with KPS teach or scientific method, 85% of science teachers ever teach scientific method (KPS) and 15% said never. The next question is whether they ever teach with scientific method or KPS approach, only 7.7% who ever whereas 92.3% stated never. For science teachers who had taught scientific method with reason the topic is in 7th grade science textbook. This suggests that science teachers generally only know steps of scientific method but has not been able to apply in science teaching. The last question related to how KPS evaluate or student scientific method ability then 92.3% did not know. This suggests that science teachers are generally does not evaluation related student KPS. This condition merely illustrates that teachers know and does not understand.

Based on description of interview data above, can be concluded that science teacher understanding to KPS still low. These results are supported by KPS tests conducted only about 63.44%. This condition certainly very influential to student KPS development process through science education. In the science world, lack of science process skills is a serious problem. Because these skills will be used and became the basis for science development.

3.1 Implications in the Lack of Science Teacher KPS Understanding

Some implications or impact from the low science teachers KPS among others to science teacher ability generally. This was evidenced by competency test results conducted by Kemendikbud that teachers in Jambi including having low yield, that is 35.7 (mendikbud, Kompas online, 16-3-12). Another effect from the lack of science teacher understanding to KPS is the lack of effective science teaching learning activities (KBM). Observation capabilities, for example, very important for teachers in effective science KBM. Through KBM observation in the classroom and outside science teachers can monitor student learning activities with a more accurate, so the teacher know accurately any student who needs help in learning. The low teachers ability in observation, then science KBM becomes less effective.

Classification capabilities are also very important in science KBM. With a good classification science teachers can making group students exactly as needed. Students classification in science learning for example based on

ability, motivation to learn, and so forth. Classification capabilities will greatly assist students in providing treatment to students more accurately. Referring to low science teachers KPS (including classification), it could be a classification or grouping students by science teachers during for this to be less accurate. So, study group conducted for this to be less effective. Similarly, inference and measuring capability, both are very important to support science KBM success.

The low score KPS elementary of science teachers will also greatly affect to teacher ability in science teaching at schools particularly to student KPS development. Based on previous research, as has been described above that student KPS development generally through laboratory activities. Science teacher KPS understanding relatively low of course will make science teachers in KPS developing through laboratory activities. In laboratory activities needed ability to observe, classify, inference and predict. Therefore, by the low number of teachers understanding to KPS it is difficult for science teachers to conduct laboratory based KBM. This statement supported by reality on the ground that science teacher at junior high school still rarely perform laboratory based KBM. Based on this fact, it can be predicted that KPS of junior high school students, especially in Jambi also relatively low. Though KPS is one of the goals from science learning, it can be said that one of KPS learning objectives would be difficult to achieve.

Another implication from the lack of teachers understanding to KPS is the low student science process skills. This is evidenced by KPS test with questions developed by thatquize (specifically a matter for science process skills test) showed that average score of students KPS are 40 or student able to obtain score 51.36. If observed teachers and students KPS score not much different. This shows that science teacher understanding to KPS will greatly affect about student KPS.

The low student science process skills at junior high school in Jambi, of course have an impact on the lack of student ability to perform various activities based on experiment, such as inquiry and disconery. Though experiment is a nature of science that science as a process. Science as a process will not run properly without adequate science skills. Therefore, with these conditions, it can be presumed that are lacking or does not optimal learning activity- experiment based at the time due to lack of students science process skills.

The low scores KPS of science teachers in Jambi, influenced by several factors such as still lack access of science teachers to study results related KPS, the absence science teacher training related to KPS development, and the absence teaching material which directs teacher in student KPS development. In addition, lack of science teacher understanding to KPS also influenced by teacher education qualifications. Based on qualitative data analysis, teachers who ever heard KPS term ever fulfilling KBM for KPS and know how KPS analyze is a teacher with Master Degree qualifications.

One of solutions to address these issues is through teaching material development. Given teaching material has a very important role in KBM, teaching material development capable directs teachers to KPS developing is a very important thing. With teaching material expected to bridge the lack of science teachers KPS understanding with efforts to develop student KPS by science teachers. It is based on premise that teaching material will affect how teachers choose KBM methods. As presented by Reiser et al (2003:1 “Materials can also serve as a primary influence on how teachers should teach science”. With selection KBM methods which has been directed in teaching materials, science teachers are expected to follow the method and of course the methods developed in teaching materials must develop methods of student KPS.

4. Conclusion and Recommendation

Based on interview data description above, it can be concluded that science teachers' understanding to KPS is still low. This result supported by KPS tests conducted at only about 63.44%. The low science teacher understanding to KPS will have implications for science KBM, so that science KBM be poor to student KPS development. Some implications the low KPS of science teachers, among others: still lack science knowledge generally for science teachers, the low of learning quality which stimulates development of students science process skills, lack of students science process skills and the low students mastery of science concepts generally.

Given KPS importance both for teachers and students there are some things that need to be done immediately, as follows: Government needs to develop a training program for science teachers in Jambi related to KPS including science teacher access related study about KPS, have developed a teaching materials that can lead science teachers to teach science with KPS approach, including for students.

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