

SENIOR HIGH SCHOOL ENGLISH TEACHERS' KNOWLEDGE AND IMPLEMENTATION OF SCIENTIFIC APPROACH IN MALANG

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Abstract: This study aims to investigate teachers' knowledge and implementation of SA. Quantitative and qualitative methods are used in this single study using test about SA, observation sheet, and field notes as the instruments. The result of this study showed that the number of training or workshops they attend is in line with their comprehension on SA. Secondly, the numbers of teachers who belong to deep knowledge category and shallow knowledge category are balance. Specifically, teachers with good knowledge tend to have strong knowledge about the concepts related to the characteristics, principles, and learning models of SA and steps of SA. The next, teachers with have fair knowledge are weak regarding the characteristics and steps in SA. The last is teachers who have poor knowledge do not understand mostly the concepts about SA. Related to the implementation, teachers who have good knowledge apply similar patterns like teacher with fair knowledge in applying the steps of SA.

Keywords: teachers' knowledge, implementation, scientific approach

Abstrak: Penelitian ini bertujuan untuk mengetahui pengetahuan dan implementasi pendekatan saintifik oleh guru. Metode kuantitatif dan kualitatif digunakan dalam penelitian ini. Adapun instrumen yang digunakan adalah tes tentang pendekatan ilmiah, lembar observasi, dan catatan lapangan. Hasil penelitian menunjukkan bahwa jumlah pelatihan atau *workshop* yang mereka hadiri sebanding dengan pemahaman mereka tentang pendekatan saintifik. Kedua, jumlah guru yang masuk kategori pengetahuan yang mendalam tentang pendekatan saintifik seimbang dengan jumlah guru dengan pengetahuan yang rendah. Guru dengan pengetahuan yang baik cenderung memiliki pengetahuan yang kuat tentang konsep-konsep yang berkaitan dengan karakteristik, prinsip, model pembelajaran, dan langkah-langkah dari pendekatan saintifik. Berikutnya, guru dengan pengetahuan yang cukup memiliki keterbatasan dalam memahami karakteristik dan langkah-langkah pendekatan saintifik. Guru yang memiliki pengetahuan yang lemah tidak memahami sebagian besar konsep-konsep tentang pendekatan saintifik. Terkait dengan implementasinya, guru yang memiliki pengetahuan yang baik menerapkan pola yang sama seperti guru dengan pengetahuan yang cukup dalam menerapkan langkah-langkah dari pendekatan saintifik.

Kata kunci: pengetahuan guru, implementasi, pendekatan saintifik

Responding the globalization challenge, Indonesia recently has implemented the new curriculum, namely 2013 Curriculum. 2013 Curriculum is a new curriculum as a change of 2006 Curriculum which is declared in the decree No 81A and B, 2013. There are some differences between previous curriculum and 2013 curriculum. One of them is it is crucial to integrate soft skills and hard skills which embrace the domain of cognitive, affective, and psychomotor during learning process in this new curriculum (Shofiya, 2014).

2013 Curriculum is implemented since Indonesia students still have low achievement among countries in the world. Rather than teaching students how to think critically, teachers still put cognitive domain as the most essential part to be raised in teaching and learning process. Those in charge of making the educational policy believe that through the introduction of SA, Indonesian students will get better achievement (Widyantoro, 2014). SA, the approach used in 2013 Curriculum, has to be applied in the teaching of all subjects, including English. Anthony (1963) as cited by Brown (2007:14) mentioned that approach as a set of assumptions dealing with the nature of language, learning, and teaching. According to the guideline of the teaching and learning process ruled by Department of Education and Culture (2014:30), the aims of implementing SA are to increase the students' intellectual ability, specifically in high-order thinking, to grow students' ability in solving problems systematically, to gain better result of the learning process, and to train the students to communicate their ideas, particularly in composing scientific writing as well as to develop the students' characters. To achieve the purposes of SA, there are five steps should be applied as stated in the decree No 58, 2014. It includes observing, questioning, collecting data, associating, and communicating.

Firstly, the observing step is defined as step for the students to observe materials in form of social function, structure of text, linguistic features, from written or oral text in the form of interpersonal, transactional, and functional text in reading texts, videos, or audios. In this step, students are encouraged to observe the environment using their five senses. This step is the development of inquiry-based learning and constructivism which requires the students' active participation so they will not only rely on the teachers' explanation to get the knowledge as well as to develop their thinking skills (Nuraeni, 2015). It may enhance students' curiosity to gain meaningful learning.

The second step is questioning. The aim of this step is constructing knowledge about social function, linguistic features, and structure of the text in groups or whole class. The purpose of questioning is also to gain additional information related to what they observed. As the example, teachers can ask such questions as 'What is the meaning of ... in English?' or 'How do you say ... in English?'. They may also ask questions related to a text, for example, 'What is the generic structure of the text?' 'What is the function of the text?'

The third step is collecting data or information. In this process, students learn to apply or express something new that they have learned before in the real context. Moreover, students are asked to do experiments and explorations to understand and express the knowledge and skills obtained. This is closely related to Piaget's theory in which personal meaning can be constructed based on experiences (Williams & Burden, 1997:21). In English classes, the experimenting step can be done by exploring more sources or examples in other books or through online, doing simulations, role-play, and doing other structured activities.

The fourth step is associating. In this step, students process the information which is obtained from activities they have done previously. The information is processed to increase the knowledge or to solve the problems in learning (Nuraeni, 2015). Furthermore, by processing the information, students are expected to be able to draw a conclusion. Based on Williams and Burden (1997:15), '...attention, perception, and memory become the focus of the work of information processing theorists.' During the association step, the students are asked to improve their understanding by analyzing, classifying, categorizing, inferring, or comparing different expressions, text structure, and elements of language.

Lastly, communicating is the last step that should be applied. It aims to develop students' ability to present knowledge and skills obtained in through oral or written form. Meaningful feedback is crucial to be given to evaluate and improve the students' understanding of the material learnt. Vygotsky states that "... the importance of language in interacting with people; not just speech, but signs and symbols as well (William & Burden, 1997:40). Related to this theory, the communicating step involves more interaction from both teacher and students' sides as they are expected to give and get meaningful feedback each other. By applying these five steps, it is expected that SA will lead students to meaningful English learning since they experience the learning process.

Previously, several studies have been conducted by researchers about the implementation of SA. Arfianti (2014) conducted a study in SMPN 5 Malang". The researcher observed three English teachers who taught 7th grade students by using SA. The results showed that teachers applied various activities in each step of implementation of the SA. However, not all steps can be done in one meeting because of some practical reasons, such as the limited time.

Another descriptive-qualitative study was also conducted by Nuraeni (2015) about the implementation of SA in English classes at SMA Negeri 6 Malang. The findings showed that teachers already understood the concept of SA in which they found it flexible to implement the approach during the teaching and learning process. In the same way, another study was also conducted by Anni (2014). The result shows that the implementation of steps of SA in the classroom was not maximized by teachers. Some steps were not conducted in the teaching and learning process.

In addition, Muniroh (2014) raised a similar topic in her study which investigated the challenges faced by the teachers in the implementation of 2013 Curriculum and their recommended solution. This study involved 7 SMP teachers in Malang city; one teacher was assigned as the trainer-teacher and the others were assigned as the target-teachers. The result showed that 2013 Curriculum had been implemented well in the target schools in Malang city, especially for English subject. However, there were challenges on the target teachers' lack of understanding on the concept and implementation of SA and assessment on manner competence.

Dealing with teachers' knowledge on SA, there is no any quantitative research or previous studies investigated in Indonesian context. Therefore, conducting the research about the teachers' knowledge on SA and implementation of SA is important since there are some problems found in understanding concept and implementing SA. Teachers' misinterpretations on SA may give impacts to the implementation of SA in the classroom. Further, it will influence the achievement of students in achieving learning objectives.

METHOD

The aim of this study is to get the objective description about the teachers' knowledge on SA and implementation of SA by Senior High School Teachers in Malang. The principles of the quantitative and qualitative techniques are utilized in a single study to collect and analyze the data using test about SA, observation sheet, and field notes as the instruments.

The population for this research was public senior high school English teachers in Malang. The teachers who were involved in this study are 32 teachers out of 41.

There were three instruments used to conduct this study: test, observation sheet, and field notes. Test was used as the major instrument and observation and field notes supported the major instrument.

Test about Scientific Approach

The test is aimed at knowing teachers' knowledge about SA. The researcher decided to adapt the test provided by the Indonesian Ministry of Education and Culture for English teachers in the official training of 2013 curriculum from the government. The researcher adapted the test since there are some points in the test related to the main variable in this approach which is about SA. In addition, there were many questions added by the researcher since the test provided by government only elicits some parts of SA. They were made based on the teacher's training material of implementation of 2013 Curriculum in English. The test used in this study consists of 36 questions in form of multiple choices. The questions provided are related to aims, principles, characteristics, learning models, and steps of SA.

Observation Sheet

The observation sheet was utilized to guide the researcher to conduct observation focusing on the implementation of each step of SA of Curriculum 2013 done by the English teachers. Its function was to guide the researcher to describe how the steps of SA implemented in the teaching of English done by the teachers who were being observed. The observation sheet was made in form of observation checklist. The observation only focused on the whilst activity in the teaching and learning process.

Field Notes

According to Bogdan and Bilken (1998), a field note is an important document which is able to help the researcher to collect more data since it is a written account of what the researcher hears, sees, experiences, and thinks in the course of collecting and reflecting on the data in a qualitative study. Field notes were useful to help researcher to take some notes of what happen in the classroom during the teaching and learning process which is not covered by the observation.

Data Collection

In this study, the researcher collected the data by administering the test and conducting observation to the teachers. The data of this study were obtained from the result of the test, observation and field notes. All teachers will be tested while only few teachers are observed.

As the first step, the tests were distributed to public senior high schools English teachers after the researcher asking the permission of the headmaster before. Out of 41 tests distributed, 32 (78%) were completed and returned to the researcher. The score obtained from the results of the tests divided the teachers into five categories of knowledge: "very good" (85—100), "good" (70—84), "fair" (55—69), "poor" (40—54), and "very poor" (0—39). Secondly, the researcher asked permissions to the teachers who are willingness to be observed before observation was conducted. In this research, observations were held in SMAN 2 Malang, SMAN 3 Malang, and SMAN 5 Malang. The researcher also brought some notes in the classroom to write anything happen during the observation besides having observation checklist as the guideline.

RESULTS

The following table gives information about teachers' knowledge on SA. It is found that teachers' knowledge is varied in terms of different categories. It is indicated by the percentage that represents whether teachers had very good, good, fair, poor, or very poor knowledge.

Table 1. Categories of Teachers' Knowledge on Scientific Approach

No	Categories	Quality	Number of Teachers	Range of Scores	Percentage	Cumulative percentage	Levels of Knowledge
1	1	Very good	0	-	0%		
2	2	Good	16	72.22-80.55	50.00%	50.00%	Deep
3	3	Fair	13	58.33-69.44	40.63%		
4	4	Poor	3	44.44-52.77	9.37%	50.00%	Shallow
5	5	Very poor	0	-	0%		

As an example, in category 2, 50.00% teachers have good knowledge on SA. Surprisingly, based on the result, there are no teachers having very good and very poor knowledge since no scores fulfil the range of category 1 and 5. Furthermore, these five categories can accumulatively be divided into two major groups: deep and shallow. “Deep” consists of two categories: “very good” and “good” representing 50.00% of the teachers. “Shallow” contains three categories: “fair”, “poor”, and “very poor” representing 50.00% of the teachers. It is obvious that the number of teachers possessing “deep” knowledge and “shallow” knowledge on SA is balance.

English Teachers’ Knowledge on Scientific Approach Teachers with Good Knowledge

Teachers with good knowledge had some various characteristics about background of the teachers and about teachers’ knowledge on SA. Teachers’ knowledge then was divided into three sections; section 1 about aims of SA, section 2 about characteristics, principles and learning models of SA, and section 3 about the stages of the method. Dealing with the background, the percentages of the last educational level of teachers were same between undergraduate and graduate program. For the teaching experiences, they had started teaching English long before 2013 Curriculum is used. Only 1 (6.25%) teacher has taught no more than 5 years. Furthermore, more than half of teachers with good knowledge already join those kinds of training three or more than three times.

Regarding the knowledge, category 2 teachers have different levels of knowledge. Half of teachers (50%) had very poor knowledge about the aims of implementing 2013 Curriculum. On the other hand, the rest of teachers had very good and good knowledge (19% and 31% respectively). Although those who were very poor understood the expected ability possessed by students by implementing SA, they did not understand the aim of 2013 Curriculum that education is seen as the interaction between teacher and students to develop meaningful learning and knowledge for the future. Additionally, they also failed to answer the main principle of implementing SA. Based on the percentages, they indicated that most of teachers with good knowledge did not know much about the aims of implementation of 2013 Curriculum.

In section 2 about characteristics and principles and learning models of SA, 14 (87%) teachers had good knowledge, and 2 (13%) teachers possessed fair understanding about the concept. All teachers were able to deal with characteristics of SA such as underlying principle of SA, learning through modelling, learning by observing, learning by experimenting, and learning by using various sources. However, the majority of teachers did not understand the role of teacher and explanation given by teacher in inquiring process. Related to principles and learning models, most of teachers had strong knowledge on characteristics of discovery learning and problem-based learning although some of them did not perceive the concept of project-based learning well.

In section 3, the majority of teachers had very strong knowledge about the stages of SA. Ten teachers had very good knowledge, five teachers had good knowledge, and only one teacher had fair knowledge. The teachers with very good knowledge were able to explain 91-100% of the stages, the aim of every stage and the activities conducted in the stages of SA. Meanwhile, some of teachers who were in good and fair level of understanding still faced problems in answering question about questioning and associating stage.

Teachers with Fair Knowledge

Some characteristics of teachers with fair knowledge were quite similar to teachers with good knowledge even though there were some sections in which the results were significantly different from each other. Regarding the first, most of teachers (69%) having fair knowledge graduated from undergraduate level of university while the rest graduated from graduate program. The data shows that 85% of teachers have taught English for more than 10 years. Only one teacher had 6—10 years experiences in teaching and the other one has taught less than five years. Rather different from the result of teachers with good knowledge, fewer teachers joined the training, workshop, or seminar about 2013 Curriculum or SA more than three times.

In part B, some of teachers still had major problems in answering the aims of implementing 2013 Curriculum. Most teachers had fair knowledge about the characteristics and principles and learning models of SA, and the numbers of well and fairly knowledgeable teachers were balance in section 3 which was about the stages of SA. Particularly in section 1, the percentage of those who had good knowledge was equal to teachers who possessed poor knowledge which is 46%. The other teachers in this category, similar to the characteristic of teachers with good knowledge in category 2, had major problem in answering the test which was about meaningful knowledge and learning as the goal of 2013 Curriculum specifically SA. There were 11 (85%) teachers chose the wrong answer.

In the next section, the levels of knowledge were also quite varied; 1 (8%) teacher had good knowledge, 10 (77%) teachers had fair knowledge, and 2 (15%) teachers had poor knowledge on characteristics and principles and learning models of SA. One teacher that had strong knowledge could answer well about the concept learning by experimenting and learning by various sources. However, the teacher chose wrong answer toward the question about the theoretical principle underlying SA. In general, teachers mostly did not understand about the concept of learning through modelling. They simply could not really differentiate between learning through modelling and learning through observing.

Additionally, most teachers (85%) did not perceive good understanding about the features observed in the teaching and learning process (structure, phrases, vocabulary, etc.) Most of them chose either the use of writing format or the use of picture in the text as guide to help students to find the aim of the texts rather than vocabulary as the important part of a text. Similar to category 2, teachers with fair knowledge also had inappropriate responses answering the questions about learning through inquiring. Half of teachers emphasized on students who should ask actively in the beginning of learning process, while some teachers put both teacher and student playing the most important role in developing students critical thinking. Likewise, the next question about the characteristic of explanation given by teacher in inquiring process took a lot of wrong answers from the teachers. 92% of teachers were misled by answering that the explanation should be objective and should create more problems and questions to students. After that, 62% of teachers referred the meaning of discovery learning to either project-based learning or problem-based learning. Interestingly, the problem was also found in the question about teachers' role in student-centered learning. They answered that teachers should give more explanation to students in teaching and learning process instead of facilitating them to solve problems to develop their critical thinking.

More teachers understood the stages and aims of stages in SA. Similarly, the percentages of teachers with good knowledge and fairly knowledgeable teachers sat equally reaching 46% each. Meanwhile, 2 (15%) teachers had poor knowledge. The most wrong answers in this section came from questions about questioning, associating and collecting data activities, and the aim of observing in SA. Like category 2 teachers, teachers with fair knowledge have also been misled by answering observing as the option for questioning activity illustrated in the question. Surprisingly, all of teachers answered incorrectly by referring exploring or internalizing knowledge and skills obtained into associating activity in SA instead of referring it into collecting data activity. Furthermore, 77% teachers stated wrongly that the aim of observing is either to improve the ability of expressing opinion or to develop creativity, curiosity, and the ability to formulate questions.

Teachers with Poor Knowledge

Ranging from 44.44—52.77, 3 (9.37%) teachers were considered having poor knowledge among others. Based on the background of teachers, one teacher graduates as a Master Degree from university level while the rests graduate from undergraduate level. Two of them have taught English in formal education more than 10 years while the other has 6—10 years experiences in English. In fact, teachers who had poor knowledge actually have joined some training, workshop, and seminar about 2013 Curriculum although all of them only join those activities twice.

There were also various characteristics of teachers' knowledge. 1 (67%) teacher had good knowledge while the other 2 (33%) teachers had poor knowledge about the aims of 2013 Curriculum implementation. Most wrong answers in section 1 were obtained from the questions similar to category 2 and 3 about the goal and main principle of 2013 Curriculum. However, quite different from those two categories above, teachers with poor knowledge answered differently that the goal of 2013 Curriculum is to develop students' mental state for the future. Furthermore, in section 2, one teacher had fair knowledge about the characteristics and principles and learning models of SA while the rests had low understanding about these concepts. Teacher with fair knowledge mostly got wrong answers about the learning through modelling. The teacher could not distinguish between learning through modelling and learning by observing. In addition, almost similar with the problem of teachers in category 3 faced, the teacher viewed that student who had to be initiative to ask questions in the classroom. She did not understand that teacher plays an initial role in asking questions to the students in the teaching and learning process.

Not only weak in the concept of characteristics of SA, teacher also failed to differentiate the idea between discovery learning, problem-based learning, and project-based learning. On the other hand, the teacher still had very good understanding about the concept of learning by experimenting and learning by various sources. Rather different from teacher with fair knowledge in this section, the two teachers understood only very few (38%) concepts of characteristics and principles and learning models of SA. They had good knowledge about content as initial focus in learning English. Furthermore, these teachers understood about the concept of project-based learning. Overall, the teachers had very low understanding about the other concepts of SA. Nevertheless, there were few questions that those three teachers answered correctly. They understood "constructivist" as the basic approach of SA. Moreover, they had good concept about the role of teacher as a facilitator in the teaching and learning process.

Even worse, teachers had very weak or shallow knowledge regarding the stages of SA. Generally, all of them failed to comprehend the aims and activities done in SA although in some cases they still had concise knowledge about it. They understood the aim of collecting information, associating, and communicating. Additionally, they also succeeded answering the question about the example of activity done in communicating. However, from all questions left in section 3, they got a failure which indicated that they mostly could not understand the ideas of aims and activities conducted in every step of SA.

Implementation of Scientific Approach in Teaching and Learning Process Teachers with Good Knowledge

Based on the previous finding about the result of the test, it was found that both T3 and T8 had good knowledge on SA. In implementing the steps of SA, all teachers conducted all the steps appropriately from observing until communicating although in several cases the activities conducted in the step did not represent the aim of the step itself. However, since they taught different level of students and had different materials and topics discussed in the classroom, the activities conducted in every step are also varied.

Regarding the first, T3 conducted four meetings to finish one topic which was about narrative text. In the first meeting, as the observing step, the teacher began the lesson by playing a movie about Cinderella in front of the class to attract students' attention. As the next step, the questioning step was actually done during observing step. However, no student raised questions related to the movie. In collecting information step, the teacher asked students to read the narrative text presented in their coursebook. The teacher then required them first to identify the language structure of the text. However, still, the teacher provided more specific explanation related to narrative text by showing materials through slides in power point. The teacher showed not only about the structure of the text, but also the linguistic features such as adverbial time, past tense, etc. Furthermore, character, plot, and setting in narrative text were also identified.

In the second meeting, there were several activities held in associating step. First, the teacher asked students to find other narrative stories on the internet. Furthermore, the teacher then required students to analyze the structure and element of language in the stories they had gotten. As another task, before students at the end should perform story-telling based on the stories they had, the teacher asked them to read the stories aloud one by one to check their pronunciation. Students were free to create their performance as attractive as possible. They might use properties to support their performance since it was not purely story-telling; they had to act the characters in the story, too.

In the third meeting, students performed the story in front of their teacher and friends one by one. The evaluation of the performances was done in the last meeting about narrative text. As the performances were recorded, the teacher played the videos one by one in front of the classroom. The teacher gave students a scoring rubric so that they could evaluate their friends' performances in terms of pronunciation, grammar, fluency, and gestures while they were watching the video.

Different from T3, T8 taught students of grade XI *Lintas Minat*. The topic discussed at that time was about proverb. As a brainstorming, teacher wrote some sentences "All the World is a Stage" and "Better Late than Never" on the board. Teachers asked students whether they had already known the meaning of both sentences. Some of them raised their hands and answered them correctly. Furthermore, they discussed the real meaning together so that all students got same ideas about them. Teacher then asked students about the type of sentences written on the board whether they were quote, wise words, or proverb. There was one student asking the differences between them. The teacher then answered the questions directly until they found that what were written there were proverbs.

Moreover, in collecting data step, teacher wrote ten phrases and sentences and asked students to find the meaning through online or any ways in pairs. After 15 minutes, they talked about the meaning together. As the activity conducted in collecting information step, teacher asked students to work in groups to find good stories that describe one of the proverbs provided by teacher. If they cannot find the interesting stories on the internet, the stories can be obtained from students' experiences. Students could choose randomly the proverbs that would be represented by the stories as they wanted. In associating step, students were asked to write the stories they had got in a piece of paper. After that, they had to write a script based on the story they had. Later, for the next meeting, in communicating step, the students in group had to act the script out in front of the classroom. While they were performing the story, the other students watching the performance should guess what proverb that was represented by the story. Teacher gave feedback to the students' performance and finally asked the students what they had learnt from the activities and materials discussed.

Teacher with Fair Knowledge

Apart from those two observed teachers above, according to the test result, T16 had shallow understanding about SA. However, in the practice, the teacher's performance in implementing all steps of SA could be considered as good because all activities conducted in every step were well-prepared. There were four meetings to observe. In the first meeting, the topic discussed was about narrative text. As the observing step, the teacher asked students whether they knew a story entitled *Timun Mas*. All of students answered that they had known the story since they were child. In the process, the teacher asked a lot of questions related to the content of the story. Some of them volunteered themselves to answer the questions from the teacher. The questioning step was done by the teacher during the observation process. However, no students raised questions regarding the material observed.

As the activity conducted in collecting information step, after finished discussing the story about *Timun Mas*, students were asked to find another famous story related to legend, fable, or other narrative stories on the internet. Teacher gave a chance to one student to read her story aloud in front of the classroom. While the student was reading it, the others had to really pay attention to the content of the story because they should guess the title of it. At the end, teacher asked students to mention the title of the story. Most students answered it correctly by mentioning "The Sleeping Beauty" as the best title chosen for the story.

The teacher then with students discussed the language structure presented in the Sleeping Beauty story. Teacher wrote the organization of narrative text on the board. Students were asked to point out the appropriate idea for each aspect of the text; orientation, complication, and resolution, based on the story presented. After they mentioned the ideas for each of it, teacher then gave further explanation about the organization of the text and other aspects such as plot, setting, and characters.

In the second meeting, the lesson was begun by reviewing the material about narrative text. Continuing collecting information step, students were required to read a story entitled "*Issumboshi*" from their coursebooks in 10 minutes. While they were reading it, teacher went around checking students' activities. Furthermore, they were asked to find out the structure of the text in groups of four. Most of them had already understood the structure of the text. They discussed together about the expressions or vocabulary used in the story. Moreover, students were divided again into four big groups. They were asked to write the verb 2 with the meaning from the text based on the paragraphs determined by the teacher. Given several minutes to discuss with the group, teacher and students discussed the answer together. At the end of the meeting, teacher gave homework to students to do exercises presented in the coursebook about Issumboshi.

In the third meeting, still in collecting data step, students were asked to learn by themselves and do exercises about direct and indirect speech. Few mistakes were still found in the answers, so teacher gave sufficient explanation about direct and indirect speech to all students. Furthermore, students had to find direct and indirect speech from "*Issumboshi*" story in pairs. As usual, the teacher went around the classroom to check students' work. After finished doing the first task, students were required to exchange the works. In addition, they had to change the direct speech into indirect speech and the way around. Checking their friends' works became the next activity before students submitted the works to the teacher.

In the last meeting, teacher still conducted activities to strengthen students' comprehension about narrative text by playing an audio telling a story about "The Sun and The Moon". In this associating step, the students listened to the audio twice to make sure that they got the idea of the story. By listening, students were asked to observe the characters, setting, and problem of the story. As the following activity, students were divided into five groups. Teacher asked students to be the scriptwriters to continue writing the story of "The Sun and The Moon". They were given 20 minutes to accomplish their works. They had freedom to make up any story related to the previous story. After the time was up, students should present the work or tell the following story of "The Sun and The Moon" created by them as the activity conducted in communicating step. At last, the teacher gave appreciation to students' performance and feedback related to their work.

DISCUSSION

Teachers' Background and Experiences on Scientific Approach

It can be concluded that the English teachers from all categories have different level of education, years of teaching, and experiences in joining training on SA. These different levels of various aspects actually have influenced the understanding of teacher on SA. From level of education aspect, most of teachers with good knowledge graduate as Bachelor Degree (62.5%) while the rest as Master Degree (37.5%). Although the number of Bachelor Degree is dominant, still the teachers possessing master degree are quite plenty. Similarly, teachers with fair knowledge also have similar characteristic with the previous category that the teachers mostly are from undergraduate program and some of them graduated as master in ELT. Furthermore, teachers who have poor knowledge are also varied regarding the educational level. One of them graduated from graduate program while two teachers graduated from undergraduate program. According to these findings, not all master degree teachers have better understanding on SA than those who graduated from undergraduate program. Based on *Peraturan Menteri Pendidikan Nasional Republik Indonesia No. 16 Tahun 2007* about Academic Qualification Standards and Teacher Competence, the academic qualification for Senior High School teachers is a minimum of Strata 1, which means a bachelor degree (S1) of the subject matter they teach, which is English. Although all teachers even have fulfilled the criteria of qualified teachers in English, it does not guarantee that they will have strong knowledge on SA. This suggests that the educational level actually does not affect significantly to the teachers' understanding about SA.

In terms of years of teaching, most of teachers from all categories have taught English for more than 10 years. Only several teachers have been teaching English for less than 10 years, and very few teachers have taught less than 5 years. It indicates that they have had adequate teaching experiences at school and these experiences may have something to do with their understanding. Moreover, all of them had taught English before SA was introduced and implemented in 2013. It is believed that they should know not only about the theoretical matters but also the practice matters on SA. It is proved that most teachers with deep knowledge have taught English for very long time rather than teachers with shallow knowledge. However, two teachers with fair knowledge actually have also had more than 10 years teaching experiences. King, in Suharyadi (2015), states that the teachers with adequate experiences of teaching tend to have effective teaching and knowledge of teaching and subject matters. In line with the theory, their experiences may influence teachers' understanding on SA, yet it seems that it cannot be a key whether teachers with long teaching experiences guarantee they will have better understanding than who do not.

The other aspect which is important to discuss is teachers' experiences on Scientific Approach. In this context, it means that how teachers engage themselves with workshop, training, or seminar related to 2013 Curriculum specifically Scientific Approach. Based on the findings, all teachers from all categories have joined activities provided by school or government about Scientific Approach although the numbers of attending workshop or training are different across different levels. Specifically, almost all teachers with good knowledge have joined the workshop or training about Scientific Approach more than three times.

In contrast, most teachers who have shallow knowledge on Scientific Approach have a limited number of joining the workshop or training. They have joined not more than three times. It is obvious that more trainings or workshops attended by teachers somewhat give affect teachers' knowledge well. It can be seen that the more teachers join the seminar, the better their knowledge is. In fact, there is an unfair treatment to the teacher regarding the workshops or trainings attended by teachers. Even though the teachers are actually in the same school, they are not given same chance of attending workshop or training related to Scientific Approach. One English teacher in one school may join the workshops more than three times. Otherwise, another teacher from that same school has only joined the workshop once. There may be several probabilities regarding the different proportion of attending workshops or training. The ages and teaching experiences by teachers may determine whether they may have more trainings or workshops to attend. It is possible that teachers who are young in terms of their ages and experiences will be relatively difficult to be the official representatives of the schools in any workshops or training (Suharyadi, 2015). Since the English teachers generally are not provided with sufficient training on Scientific Approach, then they cannot be expected to have strong knowledge on Scientific Approach.

In conclusion, all aspects from teachers' background and experiences on Scientific Approach have influenced the knowledge of the teachers. However, teachers with teaching experiences and level of education do not simply guarantee that they have deep knowledge on Scientific Approach. Meanwhile, the number of training or workshops they attend is in line with their comprehension on Scientific Approach.

Teachers' Knowledge on Scientific Approach

In this part, it refers to the teachers' understanding of the concepts of Scientific Approach. It deals with the teachers' understanding on the aims, characteristics, principles, learning models, and steps of Scientific Approach. Teachers' knowledge are very fundamental and become prominent component determining the teachers' competent in conducting good activities and effective teaching in the classroom. An effective teaching becomes of the factors of the quality of teaching and students' learning progress (Hayat and Yusuf, 2010).

As discussed in this study, there are three categories of English teachers' knowledge which reflect their levels and understanding on Scientific Approach. These categories include "good, fair, and poor". The first level belongs to the teachers with deep knowledge on Scientific Approach and the last two levels belong to the teachers with shallow knowledge. Surprisingly, based on the findings, the numbers of teachers who belong to deep knowledge category and shallow knowledge category are balance. It indicates that some of teachers have understood the concept of Scientific Approach while some of them still do not understand what is stated in the curriculum. This result is not in line with the previous studies about teachers' knowledge on GBA (Genre Based Approach) conducted by Lana and Suharyadi. GBA was the approach conducted before the use of Scientific Approach in English Language Teaching in Indonesia. Lana (2009), from her study report interviewing senior high school English teachers who get a scholarship in Australia, states that English teachers have low knowledge on GBA or do not understand the concepts of GBA. She then mentions that the teachers' limited understanding of this approach has influenced their confidence to use this approach in their classroom. Suharyadi (2015) adds that senior high school English teachers in Malang still shallow knowledge on GBA although teachers' knowledge does not influence the way of teaching by teachers using GBA.

By having these different categories, there are some patterns that can be explored and drawn from the findings. According to the results, teachers who have deep or shallow knowledge apparently have various levels of knowledge in Part B (section 1 about the aims of implementing Scientific Approach, section 2 about the characteristics, principles, and learning models of Scientific Approach, and section 3 about the steps of Scientific Approach. As the first, teachers with good knowledge tend to have strong knowledge about the concepts of Scientific Approach related to the characteristics, principles, and learning models of Scientific Approach and steps of Scientific Approach. Although in fact, there are some concepts that are misunderstood by teachers such as the role of teacher and explanation given by teacher in inquiring process and project-based learning as one example of learning models of Scientific Approach. It can be seen that they actually already have right concepts on Scientific Approach covering not only the theoretical matters but also practical matters since they mostly chose the correct answers from the tests. It can be influenced by their backgrounds which seem to have held a master's degree in English language education, and have more trainings and workshops on Scientific Approach.

However, teachers with good knowledge are weak in the concept related to the aims of implementing Scientific Approach because they cannot explain the concepts based on the curriculum such as education is seen as the interaction between teacher and students to develop meaningful learning and knowledge for the future. Furthermore, they also failed to answer the main principle of implementing Scientific Approach that everyone in the teaching and learning process is considered as a teacher, student is the learning source for the teacher, and learning can be done inside or outside class. They mostly chose that everyone is considered as student and teacher, and classroom is anywhere. It is obvious that the teachers in this category have been exposed to what to teach and how to teach English based on Scientific Approach stated in the curriculum. Nevertheless, they do not really pay attention to the real aims of implementing Scientific Approach while they really care about the theoretical concepts dealing with the characteristics, learning principles, learning models, and steps of Scientific Approach as the guide in the teaching and learning process in the classroom.

The next is teachers with fair knowledge on Scientific Approach are weak in section 2 and section 3 which mainly about the characteristics and steps in Scientific Approach. They cannot differentiate learning through modeling and learning through observing. In addition, they also do not perceive good understanding about the features observed in the teaching and learning process (structure, phrases, vocabulary, etc.). Teachers also made wrong answers on principles and learning models of Scientific Approach particularly about definition of discovery learning and project-based learning. The problem was also found in the question about teachers' role in student-centered learning. Teachers in this category answered that teachers should give more explanation to students in teaching and learning process instead of facilitating them to solve problems to develop their critical thinking. In this case, probably, the teachers are still influenced by the traditional method that put teacher as the center in the teaching and learning process. In general, teachers in this category have shallow knowledge on Scientific Approach since they cannot choose the correct answer and define the correct concepts about Scientific Approach. It can be concluded that probably teachers are not aware of the guidance given by government in form of materials about Scientific Approach. Furthermore, the lack of trainings can be the cause of the lack of knowledge possessed by teachers.

The last is teachers who have poor knowledge on Scientific Approach are very weak in all parts. They do not understand mostly the concepts about Scientific Approach. Regarding this issue, it can be caused by the very lack of training since the teachers in this category have joined the training on Scientific Approach only once or twice at most. They are also probably not kept updated with the development of English language teaching in Indonesia.

In brief, the teachers who have deep knowledge tend to know a lot about the concepts of Scientific Approach covering the characteristics, principles, learning models, and steps of Scientific Approach. Otherwise, teachers with shallow knowledge do not understand plenty of Scientific Approach concepts.

The Implementation of Scientific Approach in English Language Teaching

Scientific Approach is characterized with the models of teaching in the form of several steps. The implementation of Scientific Approach covers some steps that should be conducted by teachers including observing, questioning, collecting data or information, associating, and communicating.

1. Observing

Based on the guide from curriculum, observing step is conducted to build their knowledge and recall their existing knowledge in order to bridge their background knowledge to the coming knowledge given to students. It can be done by presenting materials in form of texts, pictures, audios, videos, or even without any tools. The content of materials should be the main focus to be observed at the first. Based on the findings, although all teachers in various categories have various kinds of activities conducted in observing step, the purpose is still the same which is to recall their existing knowledge related to their daily life. T3 chose playing Cinderella movie to attract students' attention in the beginning of the lesson to finally introduce them to narrative text. Not much different, T8 started the lesson by playing a song to be listened by students. It led later on to the topic discussed which was about paired conjunctions which could be found in the lyrics of the song. Furthermore, for the next topic, T8 did different activity in observing step. The teacher just wrote some proverbs on the board for students to be observed. On the other hand, asking students about *Timun Mas* story became the first step that T16 did in observing step.

These activities suggest that teachers have already implemented observing step in line with some theories. All of activities can trigger students to recall their memories about something related to their daily life. Lazim (2013:4) and Suharyadi (2013:1350) stated that meaningful learning is the main concern of conducting observing. It can be seen from the materials chosen by the teachers that already known by the students before. It means that the materials presented are contextual so that it may create meaningful learning with or even without tools. The discussion in observing step between teacher and students is believed can create a framework for students to know what they are going to learn in the next step. It is supported by Bruner's theory as stated by Williams and Burden (1997: 24) that the growth of the students' understanding of what they are learning is at the top of everything in the education. Thus, giving chance for the students to open their mind to build their cognitive skills is a must in education. In addition, varieties of activities conducted by teachers are also helpful to create meaningful learning. Nasution (2013:4) mentions that observing step challenges the students in learning as well as presenting real objects as the teaching media and helping the students to find it enjoyable in learning. It means that teachers' role as facilitator play an important role in creating students' eagerness to learn without feeling pressures by presenting interesting activities in the beginning. Therefore, related to the findings, teachers with good knowledge have made a good start in the first step while teacher with fair knowledge has to consider creating more interesting activity rather than just asking students without any media provided.

2. Questioning

As stated in the curriculum, questioning step is done after observing step, while in fact, all teachers did not separate the questioning activities with activities conducted in observing step. They did the questioning step during the observation. Appendix IV of the Decree of Ministry of Education and Culture No. 81A/2013 on General Teaching and Learning Guideline states that the questioning step aims to construct knowledge related to the topic and develop students' critical thinking through the process. Based on the findings, most questions raised came from the teachers. It is actually in line with the role of teachers

in implementing Scientific Approach that they should initially act to stimulate students' process of thinking. For example, T3 asked students to identify the plot, setting, and the characteristics of the character based on video played in front of them. Furthermore, the teacher asked students to guess what they would learn by watching the movie at the beginning. T8 gave some questions related to the idea of the song that they had heard together. Regarding the proverbs topic, T8 stimulated students by leading them to think whether the type of sentences written on the board was quote, wise words, or proverb. Meanwhile, similar like T3, T16 asked the students how the characteristics of each character in that story were. Questions provided by teachers are actually useful to trigger students to involve actively in the teaching and learning process.

Based on the findings, most students had willingness to answer what their teachers asked. It is in line with the theories from Suharyadi (2013) which state that (1) instruction which includes posing questions during lessons is more effective in producing achievement gains than instruction carried out without questioning students, (2) students perform better on test items previously asked as recitation questions than on items they have not been exposed to before, (3) oral questions posed during classroom recitations are more effective in fostering learning than are written questions, (4) questions which focus student attention on salient elements in the lesson result in better comprehension than questions which do not.

In questioning step, it also aims to practice students to ask to represent that they think critically during the learning process. Students are active subjects during learning process and they have to get involved building the pattern of what they learn in their mind (Williams & Burden, 1997:13). Yet, only few students who were brave to raise questions toward the materials they observed. Most of students were reluctant to ask questions to the teachers. Therefore, teachers' guidance is needed to make the students raise questions by themselves.

3. Collecting Information

The third step is collecting data or information. In this process, students learn to apply or express something new that they have learned before in the real context. Further, students should prepare the words, grammar, and other linguistic features used to express what they have learned. This step aims to implement their knowledge, gain the information, build the learning habit, and understand the long life learning. Based on the findings, there were many activities conducted by teacher to reach the goal in this step. Eventually, teacher with fair knowledge conducted more activities to deeper the understanding of students rather than teachers who have good knowledge. It can be seen from the plenty of activities such as exploring more sources to be analyzed and several structured activities done by students before they really have to make product or project in the following step. Furthermore, teacher with fair knowledge is able to guide students to explore more texts or sources by themselves and analyze them together. In addition, the further explanation related to the topic was also given by the teacher.

Different from teachers with good knowledge, teacher in this category conducted a lot of structured activities individually or in groups to strengthen their comprehension about the topic discussed. There is more than one exercise that students should do to make sure that they understand every detail of the text covering the organization of the text, linguistic features, etc. Teachers with good knowledge actually conducted similar activities done by previous teacher. However, the text or source that students had to explore was limited and there were limited number of structured activities to strengthen their comprehension. Mostly, the teachers just provided materials in the coursebook or by themselves for students to analyze. Moreover, they tend to conduct classroom discussion as the best way to discuss the deep analysis on the text or material discussed. Similar to teacher with fair knowledge, these teachers also gave detail explanation about the topic discussed regarding the structure of text, linguistic features, etc.

The way teachers held activities in collecting information step has been in line with Piaget's theory, in which Williams and Burden (1997: 21) stated that giving the students experiences will help them in constructing their understanding. Specifically, students are given opportunities to present their knowledge and relate their knowledge with the experiences that they have obtained before. In addition, Nasution (2013: 8) and Lazim (2013: 7) mentioned that the teachers need to evaluate the students' work or discuss it with the students. Referring to this theory, it is expected that teachers give some exercises or tasks for students so that they may know whether they have any problem related to the topic discussed. In this case, only teacher with fair knowledge has successfully provided many activities to check their comprehension toward the lesson. As a result, it is prominent to have varied and structured activities in collecting data step to broaden and evaluate students' comprehension.

4. Associating

The next step is associating. Associating is the step in which the students process the information gained from observation and other information gaining activities. The information is processed to increase the knowledge or to solve the problems in learning. During the association step, the students are asked to improve their understanding to the material learnt by as analyzing texts, classifying, categorizing, inferring, comparing different expressions, text structure, elements of language, discussing the content of the discourse, as well as obtaining feedback from teachers. Furthermore, further complex activity such as making product or project is given in associating step.

Based on the findings, all teachers gave more complex materials and assignment than they had in the previous step. T3 preferred to ask students to find other sources through internet. Moreover, students should have different story each other to be analyzed and summarized. Meanwhile, T8 chose to ask students to analyze the errors in the sentences provided in the materials given by teacher individually. In another topic, students were asked to write a script in group based on the stories they had got.

On the other hand, T16 played an audio for students to listen and analyze. In addition, as the task given, teacher asked students to work in group to be the scriptwriters to continue writing the story that they had heard. The activities that teachers held are in line with Nasution (2013: 8) that points out that associating step can be done through arranging the learning materials based on its complexity, started from the simplest one to the most complex one.

The analysis and discussion done was much deeper and details. The purpose is to help students to be able to draw a conclusion at last under the teachers' guidance. According to Lazim (2013: 6), associating deals with systematic thinking process based on the empirical facts observed to draw conclusion in the form of knowledge. Drawing conclusion is the further process of processing information gained through the previous steps of learning. Moreover, according to Williams and Burden (1997:15), '...attention, perception, and memory become the focus of the work of information processing theorists.' Therefore, students are given more assignments so that they can store their knowledge in their memories. Additionally, most teachers assign the tasks or assignments to be done in groups. Nasution (2013) believes that associating is an effective foundation of scientific attitude and motivation of the learners with regard to the intrinsic values of participatory learning. Consequently, it is expected that students are able to participate and fully involve in the learning process to strengthen their knowledge.

5. Communicating

Finally, communicating is the last step that should be applied. In language classes, creating steps is also done within the communicating step as the students are given chance to show their language products of performance to others to get feedback from their friends or teachers. According to the results, teachers in different categories mostly have conducted activities properly in line with the purpose of communicating itself. It can be seen that T3 chose story telling as the product that students should perform individually even they were free to use their creativity to perform it. On the other hand, T8 only gave quiz to check or evaluate students' understanding about the topic at the end of the lesson. Unlike the previous topic, T8 in the next topic asked students in group to perform role play in front of the classroom related to the topic discussed. Apart from the previous teachers, T16 had her own to create activities in this last step. Students, in group, should become the scriptwriters to continue writing the story they heard in associating step, then they presented the result in front of the classroom.

These activities conducted by these teachers were quite similar to the previous studies conducted by Arfianti (2014) and Nuraeni (2015) in which the teachers required the students to present their answers or products in written or orally in front of the class to get feedback from their friends or teachers. It is also emphasized by Vygotsky that "... the importance of language in interacting with people; not just speech, but signs and symbols as well (William & Burden, 1997:40), hence, the communicating step is viewed as an interaction step during the teaching and learning process in which the students are given time to interact and gain meaningful feedback from others. After finishing the performances, students were given any feedback from both teacher and other students. Meaningful feedback is essential to be given to evaluate and improve the students' understanding of the material learnt (Nuraeni, 2015). Furthermore, the participation of students in communicating step is very important since it is the right time for them to express and share ideas as clearly as well as to improve their communicative skills. Communicating is also expected to develop the students' confidence as well as their learning motivation (Nasution, 2013: 9). Students who are still shy and not brave enough to express their opinions or ideas in the previous steps can be motivated to speak up more in communicating step.

Teachers' Knowledge and Implementation on Scientific Approach

Related to the implementation of Scientific Approach, it can be drawn that teachers who have good knowledge apply similar patterns like teacher with fair knowledge in applying the steps of Scientific Approach. Additionally, teacher with fair knowledge applies the steps more well-prepared than one of the teacher with good knowledge in terms of activities. There are more varied activities conducted by teacher who has fair knowledge than teachers in good level of knowledge. On the other hand, it does not mean that teachers with good knowledge are worse in conducting the activities. In fact, although the activities are limited, teachers with good knowledge are able to create more attractive and enjoyable atmosphere in the classroom. It indicates that teachers' knowledge does not significantly correlate with the implementation of the method in the teaching and learning process. What they know does not always guarantee what and how they teach by using Scientific Approach.

As the first example, teachers with good knowledge employ appropriate steps of Scientific Approach. They follow the systematic steps of Scientific Approach starting from observing to communicating. The learning processes are begun by observing activities such as playing a movie, listening to a song, and writing sentences on the board related to the topic given. The teachers in this category always begin the lesson by showing something attractive or interesting throughout the use of media. The questioning steps are mostly done during the observing step in which mostly the teachers who ask initially related to the materials observed. The next is teachers ask students individually or in group to explore more sources regarding the topic given and give material to the students to be analyzed and further give them explanation in detail toward the topic in the collecting information steps. Then, in the associating steps, varieties of activities are also found such as analyzing another text related to the topics and preparing or making a project orally or written to be communicated later in the communicating step. As the last step, communicating is done through delivering or presenting the oral tasks in front of classroom individually or in group and also giving quiz to the students covering the topic given previously.

Likewise, teacher with fair knowledge also apply Scientific Approach in the classroom systematically and properly. The observing step is done by brainstorming students by recalling their memories about the story happened in the past and talking about the content or idea of the story. The questioning step is also done by the teacher during the observation process. Similar like teachers with good knowledge, in collecting information step, exploring more sources becomes the core activity conducted since after that teacher is responsible to give clear explanation related to the structure of text, linguistic features, etc. Different from the previous teachers, this teacher conducts the structured activities such as doing exercises in the coursebook related to the topic given in collecting step to strengthen students' comprehension. After that, teacher exposes students to another kind of text which has similar characteristics with the previous texts discussed for students to analyze deeper. The activity in associating step is also added by preparing students to make a product for communicating step in written way. As the last step, presenting the work by students in group becomes the core activity held in communicating step.

It is apparent that this phenomenon proves that although teachers are different in the conceptual level, they are actually similar or the same in the implementation level. All of them, although they are in diverse category, are good in the quality of implementing Scientific Approach in the classroom. The results of the study are not in line with the theories that teachers with good knowledge should be better in implementation level rather than those who have fair knowledge. It is easier for someone to perform the tasks if he or she understands the knowledge (Maciejewski, Mgombelo, and Savard, 2011). A few studies have also shown that the understanding of the concepts and implementation of the concepts can play off of each other, one reinforcing and strengthening the other (Byrnes and Wasik, 1991; Rittle-Johnson and Koedinger, 2009). It means that teachers who have deep knowledge on Scientific Approach should be able to teach better than those with low or shallow knowledge on Scientific Approach. In this context, both the teachers' understanding of Scientific Approach and the implementation of Scientific Approach are inevitably important. However, in this case, teachers' knowledge cannot represent strongly the way teachers implement Scientific Approach in the classroom.

CONCLUSION AND SUGGESTION

Conclusion

Generally, English teachers from all categories have different level of education, years of teaching, and experiences in joining training on SA. Teachers with teaching experiences and level of education do not simply guarantee that they have deep knowledge on SA. Meanwhile, the number of training or workshops they attend is in line with their comprehension on SA.

Secondly, the numbers of teachers who belong to deep knowledge category and shallow knowledge category are balance. Specifically, teachers with good knowledge tend to have strong knowledge about the concepts of SA related to the characteristics, principles, and learning models of SA and steps of SA. However, teachers with good knowledge are weak in the concept related to the aims of implementing SA. The next is teachers with have fair knowledge on SA are weak regarding the characteristics and steps in SA. The last is teachers who have poor knowledge on SA are very weak in all parts. They do not understand mostly the concepts about SA.

Related to the implementation, teachers who have good knowledge apply similar patterns like teacher with fair knowledge in applying the steps of SA. This phenomenon proves that although teachers are different in the conceptual level, they are actually similar or the same in the implementation level. However, in this case, teachers' knowledge cannot represent strongly the way teachers implement SA in the classroom.

Suggestion

English teachers are suggested to participate a lot in professional development programs such as workshops, trainings, or seminars and to keep updated with the development of ELT in Indonesia. Dealing with implementation, teachers should be able to attract students' attention by using attractive media, giving more challenging materials and various activities in pairs or in groups to develop their critical thinking. For the headmaster, it is expected to provide all English teachers with sufficient professional development programs such as trainings, workshops, and seminars. For the policy makers, they need to evaluate the teachers' knowledge and implementation of SA.

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