Implementing Scientific Approach to Teach English at Senior High School in Indonesia

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Abstract

Scientific approach is a teaching strategy using scientific steps in teaching subject matter at senior high school in Indonesia. Scientific approach has the characteristics of "doing science" that allows teachers to improve the process of learning by breaking the process down into steps which contain detailed instruction for conducting student learning. Although the scientific approach offers significant breakthrough in improving the quality of teaching English as a foreign language (TEFL) at Senior High School in Indonesia, there were still some obstacles faced by English teachers. This study aimed at investigating the implementation of scientific approach to teach English at Senior High School in Indonesia and problems of teaching and learning in implementing scientific approach. The data were collected through observation of teaching learning process and interview with the teachers and the students in two senior high schools in Padang, Indonesia. The findings showed that, among the five steps of scientific approach, the teachers were not able to implement the *observing* and *questioning* steps optimally yet. Meanwhile, in *experimenting* and *associating* the teachers have applied them well, and in *communicating* the teachers have applied them optimally.

Keywords: scientific approach, teaching English, questioning, experimenting, associating, communicating

1. Introduction

Curriculum change occurs in response to changes that take place in society (Oliva & Gordon, 2013). The competence based curriculum that has been applied in Indonesian education since 2004 were considered not satisfied to achieve the aim of primary and secondary education (Intansari, 2013; Sundayana, 2015). The 2004 curriculum has not been sensitive and responsive to social change at local, national, and global level; the content of the curriculum is still too dense as indicated by the number of lesson materials and subject, the difficulties beyond the level of development of the child age; and competencies do not describe holistically the domains of attitudes, skills, and knowledge; and some of the competencies required in accordance with the development need, such as character education, active learning methodology, the balance of soft skills and hard skills, has not been accommodated in the curriculum (Kemdikbud, 2013). This curriculum can only educate students to achieve knowledge, and lack of skills and attitude. Therefore, a curriculum that can educate students with knowledge, skill, and attitude is needed to improve the quality of education in Indonesia. The 2013 Curriculum was designed to achieve this need.

The 2013 curriculum is a curriculum that can educate future competency, communication skills, ability to think clearly and critically, ability to consider the moral aspects of a problem (Kemdikbud, 2013).In this curriculum, the students are encouraged to have a responsibility to the environment, interpersonal skills, and ability to think critically (Kurniasih & Sani, 2014). It is characterized by the development of attitudes, knowledge, thinking skills, and psychomotor skills in a variety of subjects. It should be relevant with the needs of life, developing abilities and interest, and responsive to the development of science and technology. Lazim (2013) states that the 2013 curriculum should be applied in the atmosphere of focusing on student-centered learning, forming the students' self concept, increasing students' thinking skills, providing opportunities for students to assimilate and accommodate the concept, laws, and principles, and providing opportunities for students to practice the skills of communication. Kemdikbud (2013) states that the 2013 curriculum can be implemented successfully by using scientific approach. The learning process can be stated scientific if it fulfills the following criteria, objective,

factual, systematic method, accurate, logic, actual, and verified.

1.1 Scientific Approach

Scientific approach is defined as the process of finding out information in science, which involves testing the ideas by performing experiments and making decisions based on the result of analysis (Longman, 2014). It means that scientific approach is a body of techniques for investigating phenomena, acquiring new knowledge, and correcting and integrating previous knowledge. Tang et al. (2009) says that scientific approach has the characteristics of "doing science". This approach allows teachers to improve the process of learning by breaking the process down into steps or stages which contains detailed instructions for conducting students learning. These two ideas became the basic of using scientific approach to be the basis for implementing the 2013 curriculum.

In accordance with the standard competence of the 2013 curriculum, learning objectives should include the development of the realm of attitudes, knowledge, and skills. Attitudes are acquired through activity: accept, execute, respect, appreciate, and practice. Knowledge was gained through the activity of remember, understand, apply, analyze, evaluate, and create. Skills were acquired through activities of observing, asking, experimenting, reasoning, serving, and creating (Kemdikbud, 2013a). So, the teaching learning process in scientific approach referred to the process of observing, asking, reasoning, experimenting, and establishing network for all subjects.

Kemdikbud (2013) and Hosnan (2014) state that there are five steps of applying scientific approach in teaching learning process, they are observing, questioning, experimenting, associating, and communicating. The activities of each steps can be explain as follows.

a. Observing

There are two main activities that should be done to lead to the observing steps. First, the teachers give students a wide opportunity to do observation. The observation can be done through reading, listening, or seeing the object. Second, the teachers facilitate the students to do observation and train the students to observe the important things from the object. There are seven steps in observing process, (1) determining the object to be observed, (2) determining the purpose, (3) determining the way of observation, (4) limiting the object, (5) doing observation carefully, (6) reporting the result of observation, and (7) comprehending the result.

b. Questioning

Questioning functions to encourage and inspire learners to actively learn and develop questions of and for itself; to raise skills of students in talking, asking questions, and the other can answer logically, systematically using proper and correct grammar; to encourage students' participation in discussing, arguing, developing the ability to think and draw conclusions; and to build an attitude of openness to give and receive opinions or ideas, enrich vocabulary, as well as developing social tolerance in gregarious.

c. Experimenting

In experimenting, the steps are preparation, working, and follow up. There are five activities that can be done in experimenting, (1) Grouping students into several groups, (2) asking students to discuss, (3) recording the finding, (4) supervising the learning process to ensure that all learners are actively involved in the discussion, and (5) directing the group that need help.

d. Associating

Associating is the ability to analyze and associate the information occurred within the group. Associating is the process of analyzing the information to find the relationship between one information to other information and to find the patterns of interrelationship of the information so that one can make conclusion from the patterns found.

e. Communicating

Communicating is the ability to conclude the facts that have been observed and experimented. There are four activities that can be conducted in communicating steps, (1) asking the students to read their work to the class, (2) asking each group to listen well and provide additional input with regard to the work of each group, (3) giving explanation after the group discussion ended, and (5) structuring tasks and providing opportunities to the students to demonstrate attitude, skills, and understanding of the substance of learning given.

From the explanation about the steps of doing scientific approach in teaching learning process above, it can be seen that by doing scientific approach students are hoped to be actively involved in class activities by integrating skills, attitude, and knowledge. The question is "how to implement this scientific approach in teaching English at Senior High Schools in Indonesia?"

1.2 Curriculum Implementation

Implementation is an attempt to integrate the new concept or idea into practice (Zaim, 2013). Fullan (1991) mentions that implementation is a process of putting into practice an idea, program or set of activities new to the people attempting or expected to change. Implementation of any new program or policy involves changes in materials, teaching approaches, and beliefs. Related to curriculum implementation, Print (1993) states that implementation is a short-term phenomenon that attempts to integrate the new curriculum into existing practice. Implementation in this study is the process of putting into practice the new curriculum, the 2013 curriculum using scientific approach in teaching-learning process, into classroom practice.

The 2013 curriculum for primary and secondary schools in Indonesia has been through the stage of trial implementation in contributory schools assigned by the government. However, teacher readiness to implement the curriculum refers to some aspects of their comprehension, attitudes, and motivation in implementing curriculum change (Sundayana, 2015). Weiner (2009) mentions that readiness of school in implementing the curriculum change is influenced by attitude, motivation, knowledge of the program, and ability to implement. In addition, Bandura (2012) and Sundayana (2015) state that one's belief and competence to do something may determine the effectiveness of the implementation of a curriculum. Therefore, the implementation of the 2013 curriculum will be determined by the readiness of the teachers in implementing the curriculum in teaching and learning process. Only the teachers who have been trained to use the new curriculum can implement it well.

The aims of teaching English at senior high school are to achieve functional and informational level of literacy. In functional level, students are able to use the language to fulfill their daily communication such as reading newspaper, and manual or instruction. In informational level of literacy, students are able to access knowledge with their language ability (BSNP, 2006). The ability to communicate in English is the ability to deliver the message orally and in writing, the productive skills, the ability of speaking and writing. The ability to access knowledge is the ability to read the written text and to listen to the oral text, the receptive skills, the ability of reading and listening (Zaim, 2013).

1.3 Research Problem

This research was to find out (1) the way how teachers implement the scientific approach in teaching English descriptive, narrative, explanation, and functional texts, and (2) the effectiveness of the implementation of the scientific approach in teaching English descriptive, narrative, explanation, and functional texts.

2. Method

This research was a descriptive research, to describe the implementation of scientific approach in teaching English at Senior High School. This study was conducted in two senior high schools in Padang, Indonesia. The informants were 3 teachers who taught at grade ten. The teachers have implemented the 2013 curriculum in their teaching process. The data were collected by using observation sheet and interview. Observation was conducted both directly and indirectly by means of video recording instrument. The researcher took some notes and fill in observation sheet based on a rubric specifically designed based on the indicators of scientific approach as stated in Kemdikbud (2013). The indicators are observing (seeing, reading, listening), questioning (asking questions from factual to hypothetical), experiencing (determine the necessary data, source of data, and collecting data), associating (analyze the data, determine the relationship of data, summing up the result of data analysis), and communicating (delivering the results in the form of verbal conceptualization). Interview was conducted by using interview guide which was arranged also by using indicators of the implementation of scientific approach as stated in Kemdikbud (2013).

The data were analyzed descriptively to find out the answers of the research questions. To measure the quality of the implementation, the researcher used scale 1-100 with the following scoring criteria: score 81-100 = Very well, 61-80 =Well, 41-60 = Well enough, 21-40 = Badand 1-20 = Very bad. The effectiveness of the implementation can be seen from the students achievement scores after scientific approach was implemented.

3. Results and Discussion

The implementation of scientific approach in teaching English for senior high school students is related to the process of the teaching four language skills (speaking, listening, reading, writing) in four kinds of genres/texts learned at grade ten senior high school. The kinds of genres/texts learned were descriptive, recount, narrative, and functional texts. Each kind of text was taught differently in accordance with the characteristics of the text.

3.1 Teaching English as a Foreign Language Using Scientific Approach

The 2013 curriculum emphasizes the mastery of communicative competence both in spoken and written mode.

The students are directed to be competence in four language skills, speaking, listening, reading and writing. Besides, the language aspect such as vocabulary and grammar should be taught integratedly in teaching the four language skills. The teaching and learning process were conducted using genre based approach where students should have language skills in each type of text. The teaching learning process followed the steps of teaching using scientific approach as stated in Kemdikbud (2013), they are observing, questioning, experimenting, associating, and communicating.

Based on the observation on the teaching and learning process at grade X Senior High School Padang, teachers' activities in implementing scientific approach in teaching English as a foreign language can be summarized in Table 1 below.

Table 1. The summary of learning activities in teaching English descriptive, narrative, explanation, and functional texts using scientific approach

No	Steps of teaching English using Scientific Approach	Learning activities in each type of genre			
		1 Descriptive Text	2 Narrative Text	3 Explanation Text	4 Functional Text
1.	Observing	Observing 4 family photographs.	Observing the pictures about fairy tale on the slides.	Watching a video about tsunami.	Listening to utterances given and observing an object
2.	Questioning	Asking questions related to the photographs given. Teacher connected students' questions to the learning materials given	Asking questions related to the pictures given. Teacher connected students' questions to the learning materials given	Asking questions related to the video they watched. Teacher connected students' questions to the learning materials given	Asking students to ask questions related to the object given. Teacher connected students' questions to the learning materials given
3.	Experimenting	Discussing the detail information from the materials given in group.	Discussing the detail information from the materials given in group.	Discussing the detail information from the materials in group.	Discussing the features of sentences indicating intentions
4.	Associating	Finding the relationship between one information to other information.	Finding the relationship between one information to other information.	Finding the relationship between one information to other information.	Finding the examples in daily life
5.	Communicating	Reporting the result of group discussion in front of the class.	Reporting the result of group discussion in front of the class.	Reporting the result of group discussion in front of the class.	Reporting the result of group discussion in front of the class.

From the table above it can be seen that students were actively involved in teaching and learning process. Most of the students got involved in each activity created by the teacher. Every student had opportunity to speak, listen, read, and write in English related to the learning materials discussed. However, different teacher applied the steps differently in the teaching learning process.

There were five steps of scientific approach: observing, questioning, experimenting, associating, and communicating. In each step, there were 6 indicators of teachers' activities to measure whether the teacher had implemented the ideal procedures of teaching using scientific approach or not. The implementation was considered *very well* if teachers could implement those six activities. Missing one or more activities meant teacher could only implement it below the ideal procedures. The quality of the implementation can be considered *well, well enough, bad,* and *very bad* based on the scores that they achieved. The result of observation can be seen in the following explanation.

a. Observing

Observing was the activity to introduce the learning materials to be learned. The teacher gave students wide

opportunity to recognize and be acquainted with the things to be learned. In teaching and learning English, observation can be done through the activities of seeing the object, reading, or listening. There were six activities conducted in the stage of observing: arousing curiosity and interest of the students on the theme or topics of learning, presenting the learning materials on the topic of learning, asking students to observe an object associated with learning materials being taught, thinking critically and analytically, and discovering the fact based on the learning materials.

Of the three teachers observed, it was seen that teachers were not consistent in implementing those six activities. They could apply them in certain text but not for other text. The two most difficult activities were asking students to think critically, analytically and comprehensively, and discovering the facts from the learning materials given. The mean score of implementing teachers' activities in observing was 58.4 (in scale 1-100); it was qualified as *Well Enough*. The three teachers observed could only achieve average score 58.5. It means that the three teachers can be considered to have *well enough* competence.

The problems faced by the students in observing were they have limited vocabulary to express the idea related the things that they observed so that some students just keep silent.

b. *Questioning*

Questioning is aimed at building students' critical thinking, raise skills of asking questions and answering questions logically and systematically with correct grammar. There were six activities concerning with questioning: giving chances for students to make questions related to the learning materials being taught, encouraging and inspiring students to make questions actively, raising students' skills in asking questions and giving answers logically and systematically using proper and correct grammar, encouraging the participation of students in discussion, arguing, developing the ability to make questions, building attitude to openness to give and receive opinion or idea, and connecting students' questions to learning materials given.

From the six activities applied in this stage, teachers' abilities to implement the teaching activities were various. Teacher Cgot better score (75) than teachers A and B (41.75 and 62.75 respectively), while teacher B got better score than teacher A. However, in general they still had problems in "raising students' skills in asking questions and giving answers logically and systematically using proper and correct grammar" and "encouraging the participation of students in discussion, arguing, developing the ability to make questions". From the scores taken (teacher A got score 41.75; teacher B got score 62.75; and teacher C got score 75), it can be stated that teachers A was considered to have *well enough* ability in implementing questioning, while teachers B and C were considered *well*. All together they got score 59.8 meant *well enough* ability in implementing questioning.

The problem in questioning was related to the students' ability in creating questions. Since some students still have limited vocabularies only some students were eager to ask questions. It was seen that some students felt afraid of making mistakes.

c. *Experimenting*

Experimenting was the activity to find out a phenomena based on a treatment given. There were five activities concerning experimenting: encouraging students to discuss together in group, determining sourcing of information, finding and collecting necessary information, stimulating students to give his/her opinion actively regarding to the object, supervising the learning process to ensure all students are actively involved in the discussion on each group, and directing the groups that needed help.

From the six activities applied in this stage, teachers' abilities in implementing experimenting were different. Teacher A got score 54 and was considered to have *well enough* ability in implementing experimenting. Teachers B and C got scores 66.75 and 75 respectively and were considered to have *well* ability in implementing experimenting. All Teachers still had problems in "stimulating students to give his/her opinion actively regarding to the object", and "supervising the learning process to ensure all students are actively involved in the discussion on each group". Teacher B also got problem in "directing the groups that needed help".

Problem faced by the teachers was about the time. The time was too short for the students to comprehend the reading text and to follow the experiment procedures.

d. *Associating*

Associating was the activity to associate the information occurred within the group. There were six activities in implementing associating: processing the information, finding the relationship between one information with other information, discussing and associating with each group, analyzing the information, explaining the characters of the activities in detail, and finding information from other sources.

From the six activities in associating, teachers still had problems in "finding the relationship between one information with other information", "discussing and associating with each group", and "analyzing the information". Meanwhile, teacher B still had problem in "processing the information". Teachers C can implement associating stage *very well* (score 83), teachers A implemented it *well* (score 66.75), but teacher B implemented it *well enough* (score 58.5). All together, they can implemented *well* (average score 69.4).

This step needed more time to be implemented. Some students got difficulties in comparing information given with other information since they have limited vocabulary to understand the text and to express their idea related to the information that would be associated.

e. Communicating

Communicating is aimed at reporting the facts that have been observed and experimented. There are also six activities in communicating stage: performing the work in front of the class; demonstrating attitude, skills, and understanding the substance of learning in front of the class; listening and providing additional input regarding to the work; clarifying the result of the students' work based on the materials given; providing feedback on students' performance; and making conclusion.

From the six activities in communicating, all teachers can implement the stage *very well* (teacher A got scores 95.75, teacher B got score 87.25, and teacher C got score 95.75). However, teacher A still had problem in 'providing feedback on students' performance', teacher B had problems in "listening and providing additional input regarding to the work", and "making conclusion", and teacher C had problem in "clarifying the result of the students' work based on the materials given".

The problems of implementing this stage was related to the limited time available so that only a limited number of students can communicate what they have done in front of the class. Besides, the students who had low competence in English were not confident to perform in front of the classroom.

Based on the findings above, the summary of teachers' quality in implementing scientific approach in teaching English can be seen in Table 2 below.

Table 2. Summary of teachers' quality in implementing scientific approach

| No | Stages | Teachers, Scores, and Quality | | | | | | Mean Score | Quality |
| | | A | | B | | C | | | |
		Score	Quality	Score	Quality	Score	Quality		
1.	Observing	58.5	Well enough	58.5	Well enough	58.5	Well enough	58	Well enough
2.	Questioning	41.75	Well enough	62.75	Well	75	Well	59.8	Well enough
3.	Experimenting	54	Well enough	66.75	Well	75	Well	65.25	Well
4.	Associating	66.75	Well	58.5	Well enough	83	Very well	69.4	Well
5.	Communicating	95.75	Very well	87.25	Very well	95.75	Very well	92.9	Very well
	Mean scores	63.35	Well	66.75	Well	77.45	Well	69.07	Well

Table 2 above shows that teacher A implemented scientific approach *very well* in communicating, well in associating, and *well enough* in observing, questioning, and experimenting. Teacher B implemented scientific approach *very well* in communicating, *well* in questioning and experimenting, and *well enough* in observing and associating. Teacher C implemented scientific approach *very well* in associating and communicating, *well* in questioning and experimenting, and *well enough* in observing. The various quality in implementing stages of scientific approach indicated that English teachers needed more training in implementing stages of teaching using scientific approach.

From the findings above, it can be concluded that actually English teachers have tried to implement each stage of scientific approach in teaching English but not all the activities, as required in this approach, could be

implemented well. A variety of qualities in the implementation of scientific approach in teaching English indicated the readiness of the English teachers in implementing scientific approach is not well enough. Sundayana (2015) states that the demand for teachers' readiness to implement the curriculum is vital, it influences teachers' ability in managing teaching-learning process (Weiner, 2009).

3.2 The Effectiveness of Scientific Approach for Teaching English as a Foreign Language

By using scientific approach, the students were facilitated to use these four language skills integratedly. The students can actively communicate with other students in each stage such as observing, questioning, experimenting, associating, and communicating. However, to implement the scientific approach in teaching English, the student should have basic ability to communicate orally in English. In the observation, it was found that only few students can get involved in class activity using English, some still keep silent. This approach was effective for the students who have enough vocabularies to speak although with simple sentence structure. For those who have limited vocabularies, it was difficult for them to get involved in the class activity. The teachers should give more time to the students to finish each step of activity before coming to the next step to make sure that every student had finished doing the tasks given to them.

Mulyasa (2009 and 2013) states that the main factor to decide the successful curriculum implementation is teachers' creativity. Good quality of teacher depended on how well he/she could teach in the classroom. The teachers should have competence and higher responsibility to do the planned program. The teachers were demanded to create students to be productive, creative, and innovative in realizing the aims of learning. If teachers faced problems in implementing the planned program, he/she had to adjust the activities so that learning aims can be achieved.

4. Conclusion

Scientific approach can be applied as a strategy of teaching English as a foreign language in Senior High School in Indonesia. It has been implemented *well enough* by the English teachers. Among the four stages of scientific approach implementation, the stages of observing and questioning are still difficult to be implemented by the English teachers. Experimenting and associating are considered to be good enough, while communicating is considered to be well implemented. Scientific approach is effective to make the students actively involved in the classroom activities so that their speaking and listening skills can be improved. Reading and writing activities need more time to be implemented in scientific approach. However, teachers need to improve their ability in implementing observing and questioning stages and improving the activities that can improved students' ability in Reading and Writing. Scientific approach is effective to be implemented to the students who have good basic ability to communicate orally in English.

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