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Integrating Science Learning in Indonesian Curriculum

A Case Study at a Junior High School

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ABSTRACT

The 2013 Curriculum in Indonesia aimed to prepare individuals and citizens who were faithful, productive, creative, innovative, and practical, as well as actively contributing to society, region, state, and world civilization. Also, the change in the curriculum aimed to increase the students' curiosity and active participation. This study focused on adopting and implementing the 2013 Curriculum for integrative science learning in secondary school at Muhammadiyah-1 Malang Junior High School in Malang City, Indonesia. Regarding teachers' roles, the 2013 Curriculum was designed to improve teacher professionalism. However, existing literature did not show whether the teachers, learners, and schools were ready to adopt such a curriculum. Based on the analysis of the data obtained from the interviews, observations, and documentation from Muhammadiyah Secondary School, we found that the school could be ready to implement the 2013 Curriculum.

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Introduction

Some educational issues have encouraged the Ministry of Education and Culture to develop a new 2013 Curriculum. This curriculum has grown due to internal and external

challenges. Ref. [1] mentioned that the internal defiances are related to educational demands that refer to the 8 National Education Standards and factors of Indonesia's population development. At the same time, external problems refer to future difficulties, critical competencies of the future, community perceptions, development of pedagogical knowledge, and various adverse phenomena that may emerge. Also, some adverse societal events suggest that character education is urgently required.

The public's view supported this curriculum that the current education system heavily focuses on cognition, puts too much burden on students, and lacks character education [2]. The pilot testing of the 2013 Curriculum covers the assessment standard of the new curriculum, which, in addition to assessing the student's active participation in asking questions, also evaluates the process and results of student observations as well as the ability to reason the problems proposed by the teacher so that students are encouraged to think logically. Some elements that changed in the 2013 Curriculum include graduate competency standards, process standards, content standards, and assessment standards [3].

In formal education at schools, teachers are essential in improving and developing the quality of education because they are at the forefront of education implementation. Many teachers need help understanding the new curriculum. Most teachers learn about curriculum changes from a newspaper or online media. Therefore, considering the lack of teacher involvement in the 2013 Curriculum socialization, many people feel pessimistic about implementing this curriculum. However, the government has made some efforts in response to this problem by conducting pilot testing on this new curriculum through face-to-face dialogues in several regions, online conversations on the Ministry of Education and Culture website, and in writing sent to several universities and education offices [4].

A teacher is a critical aspect of the curriculum implementation. Teachers' ability is essential in improving student learning outcomes and the quality of learning. Thus, increasing the teacher's teaching competence is critical. Numerous efforts have been made in this case, including in-house training, in-service training, workshops, seminars, and an enhancement program. However, these efforts could have been more fruitful. Accordingly, these unsuccessful efforts were caused by some factors [4]. For instance, the programs planned without involving teachers, the problems presented should be more specific. In contrast, the issues the teachers face are often local and contextual, and the problems considered necessary by program developers are less important to teachers [5].

The results of the Teacher Competency Test in 2012 reflected the actual quality of most teachers. The results showed that the competency of most teachers was below the national average. Some certified teachers even got 40 out of a maximum score of 91.12%. This result suggests that most teachers performed poorly in all four competencies: pedagogical,

professional, personality, and social skills. While the Teacher Competency Test is aimed at certified teachers, the question remains regarding how uncertified teachers perform in these competencies [6]. In other words, if the certified teachers perform poorly in these areas, what about those who have yet to be certified? Therefore, these underperforming teachers (based on the teacher competency test results) must change their teaching approaches and techniques.

Besides, science teachers in some junior high schools do not seem to have interdisciplinary competencies in science (skills in biology, chemistry, physics, as well as earth and space) required by the National Science Teachers Association (NSTA), Ministry of National Education Regulation No.16 series 2007, and the authority of bachelor's degree in science education [7]. The new curriculum requires teachers to implement integrated thematic and science-based learning [8]. Also, and more importantly, they are expected to possess professional, pedagogical, social, and personal competencies.

Method

This study used a qualitative approach supported by descriptive quantitative. Based on its primary purpose, this study is descriptive research in that it describes a problem in detail following the facts observed in the field [9]. The data was collected using observation, interview, and documentation triangulation methods. The instruments include the researcher, questionnaires, question sheets, and observation sheets [10]. This research was conducted at Muhammadiyah-1 Malang Junior High School in Malang City, East Java, before the end of the first semester of the academic year 2018/2019.

A. Research Subject

The subject in this study is teachers of integrated science at the school. The supporting theme in obtaining data was the assistant principal for curriculum affairs, who was directly involved in supervising teachers and students in their integrated science learning (see Table 1).

B. Data Collecting

Ref. [11] suggests several types of scrutiny that can be used in qualitative research: participatory observation, unstructured observation, and informal group observation. An inspection was carried out to obtain data on teacher readiness in implementing the 2013 Curriculum and the application of integrated science learning based on the 2013 Curriculum in 7th grade. The data used in this study include the teacher preparation and implementation of science learning, a scientific approach, and the assessment used in the class. The data used in this study include the teacher preparation and implementation of science learning, a scientific approach, and the evaluation used in the class [12].

Table 1. Sources of Data

No	Data	Source of Data
1	Teacher readiness in implementing the 2013 Curriculum • Teacher training • Mentoring • Continuous coaching • Teacher clinic of 2013 Curriculum	• Teachers • Assistant Principal for Curriculum Affairs
2	Teacher duty in the 2013 Curriculum: • Understanding the elements which change in the 2013 Curriculum • Realizing the goals of the 2013 Curriculum • Applying the characteristics in the 2013 Curriculum • Utilizing the expected learning process in the 2013 Curriculum • Possessing four competencies • Providing integrated science syllabus and lesson plan based on the 2013 Curriculum	• Teachers • Assistant Principal for Curriculum Affairs
3	Integrated science learning based on the 2013 Curriculum • The implementation of a blended learning model • The carrying out of a scientific approach in integrated science learning • The evaluation process in the integrated science learning	• Teachers • Science students

An interview is a conversation for a particular purpose [13]. It is usually between two people. This study conducted the meeting by asking the science teachers pre-designed in-depth questions related to the research problems, including the teacher's readiness to implement the 2013 Curriculum–based science learning at Muhammdiyah-1 Malang Junior High School. The 2013 Curriculum requires science teachers to adopt integrated learning models, use scientific approaches, and conduct assessments during integrated science learning. The data was obtained from interviews with the science teachers and vice principal for curriculum affairs of Muhammdiyah-1 Malang Junior High School. The meeting was to gather data on the teacher readiness in implementing the 2013 Curriculum in the integrated science class of junior high school and the implementation of integrated science learning based on the 2013 Curriculum.

Questionnaires are some written questions used to obtain information from respondents about their personal or subjects they know. The questionnaires in this study were distributed to students to get data on the student understanding of the teaching and learning process of integrated science using a scientific approach based on the 2013 Curriculum and the learning methods and models implemented by the teachers [14].

Ref. [15] stated that compared to other methods, this method is less severe because if errors happen, the data source will remain the same and never change. In this study, documentation was used to obtain supporting data, which showed that the teachers had joined teacher training, received continuous coaching, and attended teacher clinics or consultations during the implementation of the 2013 Curriculum. The researcher also documented teacher assignments in the 2013 Curriculum, the use of a scientific approach in the 2013 Curriculum-based science learning, four competencies of the teacher, as well as science learning assessments, syllabus, and lesson plans based on the 2013 Curriculum. In this case, the data was collected from various written sources or documents in writing, archives, and images.

C. Data Analysis

The data were analyzed to obtain an accurate and concrete picture of the research subject so they could answer the research questions on whether or not the implementation of the 2013 Curriculum in integrated science learning was successful. The researcher described the documents used as data sources, clarified and checked the report with the resource person, and finally analyzed the data to conclude. The questionnaire data were analyzed using the Percentage Agreement (PA) method. In contrast, the data obtained from the observation were analyzed by calculating the rating scale and interpreted based on Table 2.

Table 2. Scale and Description

Rating Scale	Description
0.00 – 1.69	Poor
1.70 – 2.59	Fair
2.60 – 3.50	Good
3.51 – 4.00	Very good

The data analysis in this study followed the four stages Miles and Huberman described: data collection, data reduction, data presentation, and conclusion drawing [16].

Results

A. Teacher Readiness in Implementing the 2013 Curriculum on Integrated Science Learning

Data in the form of information provided by several sources, including Integrated science teachers, assistant principals for academic affairs, and science students, was obtained from questionnaires, in-depth interviews, and observations. Specifically, in-depth interviews with teachers and assistant principals for Curriculum Affairs supported the data collected from the average results of question items involving reliable sources to answer the research problems [17].

> "In any situation, teachers must be prepared to implement the 2013 Curriculum, even if required to teach in big cities or remote areas" (Teacher-1/17/01/2019).

> "Whether you like it or not, as a teacher, must be ready to implement the new curriculum. I do not mind applying the 2013 Curriculum in my science class" (Teacher-1/ 17/01/2019).

Below is a statement from the assistant principal for academic affairs:

> "Both teachers and schools always try to do the best for the science learning. Integrated science cannot separate from the scientific approach" (Asst. P/ 18/01/2019).

Based on the interview, observation, and documentation results, it can be seen that the teachers were ready to implement the 2013 Curriculum. In any situation, teachers must be prepared to apply the new curriculum. The teacher's readiness showed from their preparation

and efforts in teaching science, especially using a scientific approach. In this case, the school seemed ready concerning the teachers, learners, and the school. Besides, the Physical Data Model (PDM) provided teachers with training and seminars on implementing this 2013 Curriculum.

The science teachers put forth their best effort and continue improving learning quality. The government continues to conduct vigorous training so teachers strive to perform better based on the 2013 Curriculum. Besides the practices, the teachers must also play their role optimally in the learning process. Special education and training are needed to prepare ideal teachers based on the 2013 Curriculum. Subsequently, supervision upon returning to their respective schools is similarly crucial to reinforce their understanding of the teacher readiness in applying the 2013 Curriculum.

B. Training and Coaching in the Implementation of the 2013 Curriculum on Integrated Science Learning

Below are the results of the interviews with integrated science teachers at Muammadiyah-1 Malang Junior High School regarding training and coaching in the implementation of the 2013 Curriculum in mixed science classes:

> "Yes, I have participated in the training provided by the National Education Department and discussions in the teacher forum for science teachers. There were four or five training I attended. There were many things I learned, such as how to prepare lesson plans and how to carry out learning based on the 2013 Curriculum" (Teacher-1/ 17/01/2019).

> "I have participated in some 2013 Curriculum training, back and forth. From the city office to the assembly" (Teacher-2/ 16/01/2019).

> "Yes, it was more than three times I attended the training, seminars, and workshops, in which I learned how to design lesson plans based on the 2013 Curriculum" (Teacher-1/ 07/01/2019).

> "Schools have provided coaching, especially by the school principal, and we regularly have a small discussion with other science teachers through Subject Teacher Consultation" (Teacher-2/ 16/01/2019).

The assistant principal for academic affairs supported the information provided by the science teachers:

> "The teachers here have attended training, not to mention the science teachers. We invite teachers to any training, even though until today, only a few pieces of training for the 2013 Curriculum development have been initiated. I did not write it specifically about how often the teachers attended the training. There was some training conducted by the Department of Education of Muhammadiyah and also by the Ministry of National Education. For coaching, the school holds it regularly " (Asst. P/ 18/01/2019).

Based on the interview, observation, and documentation, it was found that the teachers have attended training and received coaching. They participated in the practice four to five times, where they learned how to prepare a lesson plan and implement learning based on the 2013 Curriculum. The teachers also discussed with their fellow science teachers and initiated

a teaching team to exchange information during the Subject Teacher Consultation. The assistant principal for curriculum affairs stated that the teachers had been involved in various training, including the ones conducted by the Muhammadiyah assembly, the National Education Department, and other workshops, as well as in coaching carried out by the school.

C. Understanding and Implementing Integrated Science Learning based on the 2013 Curriculum

Below are the interview results with some science teachers on how they understood and applied integrated science learning by the 2013 Curriculum:

> "Of course, I understand the purpose of implementing the 2013 Curriculum in this integrated science, but to implement it 100% is another matter. There are many things to improve" (Teacher-1/ 17/01/2019).

> "The 2013 Curriculum aims to prepare creative, independent and spiritual students. It means that the curriculum is changing for the better. I think I need to do it little by little as long as it meets the expectation of the 2013 Curriculum. Indeed, we cannot do it in a rush because there are many things to prepare, but I think this curriculum is good" (Teacher-1/17/01/2019).

> "The science learning is adopting thematic learning, and there was a researcher from University of Muhammadiyah Malang (UMM) yesterday. In every meeting, there should have been elements of physics, biology, and chemistry, but so far, we have been teaching according to basic competences. I know that all elements in the integrated science must include, but we are having difficulties in doing it" (Teacher-1/ 17/01/2019).

> "In applying the characteristics in the 2013 Curriculum, it cannot be 100%, because there is plenty of assessment and it is hard to check everything because the ability of the children varies but God willing, it has been running well so far" (Teacher-1/ 17/01/ 2019).

> "The main purpose of the 2013 Curriculum is to shape children's character. The element of change lies in the process and assessment because in the 2013 Curriculum, the process is more complicated and there are too many assessments. In the science class, the expected outcomes include the enhancement in knowledge, spirituality and social skills" (Teacher-2/16/01/2019).

> "The main elements of science are physics, biology, and chemistry, but I will include spirituality too. Usually, we divided our lesson into several units where each unit has a different topic, but we are aware that we should integrate biology, physics, and chemistry in one lesson. Although it may be hard, we still give the students sample-integrated science in each meeting. We also have team teaching to help the students understand the lesson better and more easily. As a teacher, we inundated by various teaching tools, but we still try to apply the 2013 Curriculum" (Teacher-1/17/01/2019).

In addition to the teacher's statements, the researcher also sought supporting data about teacher understanding and the application of integrated science learning under the 2013 Curriculum, some of which were from the principal for academic affairs:

> "Different teachers have different understanding depending on their personality, but I am very confident in the ability and background of the science teachers in mastering the subject. Some teachers have education background in biology, and some other in physics. These teachers even created team teaching for knowledge exchange in various fields including biology, physics, and chemistry to have a more comprehensive knowledge in integrated science, especially those related to the curriculum currently adopted by the school" (Asst. P/18/01/2019).

Based on the interview, observation, and documentation, the teachers have good competence and understanding in implementing integrated science learning that is in line with the 2013 Curriculum. They have attended training, workshops, and other activities necessary to apply integrated science learning.

In the 2013 Curriculum, the goal of science learning is not limited to the scientific knowledge of physics, biology, and chemistry but also includes spiritual and social aspects. In other words, the curriculum aims to produce creative, independent, and spiritual students. The assistant principal was very confident in the ability and background of the science teachers to master the subject. More importantly, these teachers from different majors, including biology, physics, and chemistry, conducted team teaching to have a more comprehensive knowledge of integrated science learning and help their students understand the lesson better.

D. Teachers have Required Competencies in Implementing the 2013 Curriculum on Integrated Science Learning

Below are the results of the interview with science teachers regarding teacher readiness in fulfilling competencies in their science teaching:

> "God willing, I have acquired the competencies necessary for implementing the 2013 Curriculum. Although it's not perfect, I will keep trying optimally to be a competent teacher. I understand that the teacher's task in the 2013 Curriculum is continuing to obtain qualification to fulfill the requirement of the new curriculum" (Teacher-1/17/01/2019).

> "In the four competencies, I may not be perfect, but as a teacher, I will strive to improve it and for now God willing, I'm trying to achieve it even though not entirely perfect. We, science teachers, will continue to achieve the required competencies, although continuous supervision is only carried out by the school. In preparing to teach integrated science and implementing the 2013 Curriculum, we conduct team teaching, so that we can be quality teachers." (Teacher-2/16/01/2019).

The assistant principal for academic affairs supports the teacher's statement:

> "The teachers here have pedagogical competence in teaching and planning the lessons. Also, the students respect the teachers because this school encourages the students to show a good manner and morality. The teachers also display their social skills in interacting with the school community. Anyway, God willing their professional competencies are also good because the teachers here are majoring in science and they carry out team teaching to perform optimally in delivering the materials in class" (Asst. P./18/01/2019).

> "Concerning the ability, the teachers here have fulfilled the criteria in implementing the 2013 Curriculum, although they have not had written proof or certificates." (Asst. P/17/01/2019).

The interview, observation, and documentation data show that the teachers have the best competencies in teaching integrated science learning based on the 2013 Curriculum. In the interviews, the science teachers and vice principal for academic affairs mentioned that the student performance in integrated science learning was assessed based on the student's active participation and test. However, there is no particular institution evaluating the teachers. Nevertheless, even so, the teachers continued to prepare themselves to achieve the four competencies: academic, personality, social, and professional skills. In the school itself, the evaluation of all subjects was also conducted based on the 2013 Curriculum.

E. Providing Learning Tools for Integrated Science Based on the 2013 Curriculum

Below are the interview results with science teachers regarding the teacher readiness in preparing the learning tools in their science teaching:

> "We always prepare it very well. If revisions are needed, we will do it to suit the 2013 Curriculum. We welcome inputs and are willing to improve" (Teacher-1/ 17/01/2019).

> "Sure, because it was designed together based on the 2013 Curriculum, I will develop it if necessary." (Teacher-2/16/01/2019).

Below is the statement of the vice principal for academic affairs:

> "For learning tools, we follow the 2013 Curriculum in making syllabuses, lesson plans, and workbooks. For teachers, there are some related training but there is no proof or certificate, but we always involve the teachers in such activities to support their profession" (Asst. P/18/01/2019).

The teacher's readiness has been proven through the learning tools they had prepared for the science class. The teachers showed the researchers the lesson plan and syllabus, which explicitly adopted the 2013 Curriculum. It was well implemented in the integrated science class, as seen from the data obtained through observations during the teaching and learning process. The observers evaluated the lesson plan using the provided evaluation form. During the two sessions, the three observers mentioned that the lesson plans for science-1 and science-2 classes had been well implemented.

The teachers prepared the right learning tools based on the interview, observation, and documentation. Both schools and teachers were ready to implement the 2013 Curriculum. The efforts of the science teachers, the assistant principal for academic affairs, the school, and students to work together were also observed during the research. Science teachers, the assistant principal, and the students worked together in implementing the new curriculum. The science teachers attended workshops and other activities to improve their teaching and designing the learning tools. These activities aim to develop their competence, which is required by the new curriculum.

F. Implementation of the 2013 Curriculum-Based Integrated Science Learning

The data of this study was taken from integrated science teachers, the assistant principal for academic affairs, students in the mixed science class, and observers who helped the researcher by attending the science classes. The data was collected from questionnaires, in-depth interviews, and observations. The data obtained from the average results of several question items involving reliable sources to answer the research problems. The implementation of integrated science learning based on the 2013 Curriculum showed that the common answers from questionnaires suggest positive results. In-depth interviews with the teachers and vice principals for curriculum affairs support this data.

"Well, in preparing our science learning, the science teachers do not experience many difficulties as the syllabus, lesson plans, as well as the teaching and learning process will not be separated from the scientific approach, but perhaps the difficulty lies in integrating biology, physics, and chemistry into one lesson, hence the team teaching" (Teacher-1/1701/2019).

"The learning process always runs well. The scientific approach to learning is very good, from observing, asking, gathering information, associating, drawing conclusions to communicating, they all run very well. Teachers must be prepared several things such lesson plan, learning media before teaching (props, real objects, image/ charts, diagram, etc.), and assessment instruments. These plans will only be meaningful if implemented in the class" (Teacher-1/17/01/2019).

"I think yes, the teachers and school have been preparing and conducting the learning and other aspects well." (Asst. P/ 09/09/2016)

Table 3. Observation results in the integrated science learning

No	Evaluation Criteria	Science Teacher-1			Science Teacher-2			Average Score	Description
		Obsr 1	Obsr 2	Obsr 3	Obsr 3	Obsr 2	Obsr 3		
A	Course identity								
1.	Include: unit, class, semester, program, subject or theme, number of meetings	4	4	4	4	4	4	4	
Average Score								4	Very good
B	Learning Indicators								
1.	Passing standard, a basic competence, and core competence match one another	4	4	4	4	4	4	4	
2.	The action verbs used to match the measured competencies	4	4	4	4	4	4	4	
3.	The indicators match the expected knowledge, attitude, and skill	4	4	4	4	4	4	4	
Average Score								4	Very good
C	Learning goals								
1.	The learning process matches the expected outcomes	4	4	4	4	4	4	4	
2.	The learning goals match the basic competencies	4	4	4	4	4	4	4	
Average Score								4	Very good
D	Learning materials								
1.	The learning materials match the learning goals	4	4	4	4	4	4	4	
2.	The learning materials match the learners' characteristics	4	4	4	4	4	4	4	
3.	The learning materials match the allotted time	4	4	4	4	4	4	4	
Average Score								4	Very good
E	Learning Resources								
1.	The learning resources match the core and basic competencies	4	4	4	4	4	4	4	
2.	The learning resources match the learning materials and scientific approach	4	4	4	4	4	4	4	
3.	The learning resources match the learners' characteristics	4	4	4	4	4	4	4	
Average Score									Very good
F	Learning Media							4	
1.	The learning media matches the learning goals	4	4	4	4	4	4	4	
2.	The learning media matches the learning materials and scientific approach	4	4	4	4	4	4	4	
3.	The learning media matches the learners' characteristics	4	4	4	4	4	4	4	
Average Score								4	Very good
G	Learning Model								
1.	The learning model matches the learning goals	4	4	4	4	4	4	4	

No	Evaluation Criteria	Science Teacher-1			Science Teacher-2			Average Score	Description
		Obsr 1	Obsr 2	Obsr 3	Obsr 3	Obsr 2	Obsr 3		
2.	The learning model matches the scientific approach	4	4	4	4	4	4	4	
Average Score									Very good
H	Learning Scenario								
1.	The learning scenario includes pre-teaching, whilst-teaching, and post-teaching activities	4	4	4	4	4	4	4	
2.	The activities match the structure of the materials	4	4	4	4	4	4	4	
3.	The delivery matches the structure of the materials	4	4	4	4	4	4	4	
4.	The allotted time matches the scope of the materials	4	4	4	4	4	4	4	
Average Score								4	Very good
I	Evaluation								
1.	The evaluation uses the correct technique and type	4	4	4	4	4	4	4	
2.	The evaluation matches the learning indicators	4	4	4	4	4	4	4	
3.	The answer key matches the questions	4	4	4	4	4	4	4	
Average Score								4	Very good
Total Average Score								**4**	**Very good**

The data analysis was done by calculating and interpreting the rating scales based on the description (see Table 3). Based on this analysis, all the aspects of the observations in the integrated science learning process are very well implemented in the integrated science learning based on the 2013 Curriculum.

Table 4. Results of the questionnaires on student understanding in integrated science learning

No	Statement	Number of Students in Class				Percentage			
		Science teacher-1		Science teacher-2		Science teacher-1		Science teacher-2	
		Understand	Not Understand	Understand	Not Understand	Understand	Not Understand	Understand	Not Understand
1	Students understand the 2013 Curriculum-Based integrated science learning.	34	-	24	10	100%	-	70,6%	29,4%
2	Students understand integrated science learning in which the scientific approach is used	34	-	24	10	100%	-	70,6%	29,4%
3	Students understand the learning methods and model used by the teachers	34	-	24	10	100%	-	70,6%	29,4%

As seen in Table 4, the students stated that they understood the lesson. In science class 1, 34 students who filled out the questionnaire after learning, all of them (100%) said that they realized the lesson. However, in Science Class 2, only 24 out of 34 students (70.6%) understood the lesson, while the other students (29.4%) said they needed help understanding it. Based on

the analysis of the questionnaire data on students' understanding of integrated science learning using the Percentage Agreement (PA) method, it can be concluded that most of the students understood the lesson.

The data analysis of the interview, observation, and documentation revealed that the implementation of integrated science learning based on the 2013 Curriculum was successful.

G. Implementation of an Integrated Science Learning Method and Model based on the 2013 Curriculum

The following information was obtained from the interview with science teachers regarding the implementation of integrated science learning methods and models:

> "One of the methods is assigning students to read, but it's hard because they have a low interest in reading. There are many obstacles, including the student's ability, so I must be extra patient with this condition" (Teacher-1/17/01/2019).

> "The method that I often use is observation, and the learning model must include a lecture because the students are not very independent. A practice must accompany even a lecture. But we still adhere to the 2013 Curriculum as written in the lesson plan" (Teacher-2/16/01/2019).

Below is the statement from the assistant principal for academic affairs.

> "I am sure because we always supervise the teachers both in teaching and in making learning tools, and I know that science learning cannot separate from the scientific approach" (Asst. P/18/01/2019).

As seen in Table 4, most students stated that they understood the methods and models used in the science class. In Science Class 1, 34 students filled out the questionnaire after learning. They all (100%) said they quite understood the learning method. However, in Science Class 2, only 24 out of 34 students (70.6%) followed it, while others (29.4%) said they needed help understanding. It can be concluded that most of the students followed the methods and models used in the science class.

Based on the data analysis of the interview, observation, and documentation, implementing integrated science learning based on the 2013 Curriculum met the expectations. The observation forms completed by three observers observing the science class showed that the learning methods and models used by the science teachers met the expectations of the 2013 Curriculum, as seen in Table 4, which earned the highest score of 4.00. It means the learning model is perfect according to the 2013 Curriculum.

H. Using a Scientific Approach to Integrated Science Classes based on the 2013 Curriculum

The following information was obtained from the interview with science teachers regarding the scientific approach used in integrated science classes.

> "This school has been using the 2013 Curriculum for over three semesters following the government policy. Integrated science learning cannot be separated from a scientific approach. In its implementation, we do team teaching because, in school, two science teachers teach science by

> combining biology, physics, and chemistry according to the basic competencies" (Teacher-1/ 17/01/2019).
>
> "Science learning has always been using a scientific approach, even before we implemented the new curriculum. As expected, science cannot separate from the scientific approach" (Teacher-2/ 16/01/2019).

Below is the statement from the vice principal for curriculum affairs regarding the scientific approach:

> "As assistant principal for curriculum affairs, I have to supervise the science teacher in conducting the teaching and learning process. Science learning must use a science approach" (Asst. P/18/01/2019).

As seen in Table 4, the students stated that they understood the methods. In science Class 1, 34 students filled out the questionnaires after learning, and all said that they followed the approach used in the science class. However, in Science Class 2, only 24 out of 34 students (70.6%) understood the procedure, while the other students (29.4%) said they needed to follow it.

Based on the analysis of the questionnaire data, it can be seen that most of the students understood the scientific approach used during science learning. Based on the data analysis of the interview, observation, and documentation, it was revealed that the scientific method used in integrated science learning matched the requirement of the 2013 Curriculum. The observation forms completed by three observers observing the science class showed that using the scientific approach aligned with the 2013 Curriculum, as seen in Table 4, where this point earned the maximum score of 4.00. It means the scientific method was suitable for science learning as it followed the 2013 Curriculum.

I. Assessing student performance on Integrated Science Learning based on the 2013 Curriculum

The following information was obtained from the interview with science teachers regarding the integrated science class assessment.

> "The assessment starts from the beginning to the end of the class. I observe everything, especially student attitudes, as part of character education, and most importantly, in this science learning, I assess the students regarding their effectiveness, psychomotor skills, and creativity at the end of the academic school year" (Teacher-1/17/01/2019).
>
> "Because this is an integrated science learning, there must be assessments in biology, physics, and chemistry. The most important thing is, the assessment follows the 2013 Curriculum" (Teacher-2/16/01/2019)

Furthermore, the assistant principal for academic affairs stated:

> "All teachers here, including science teachers, carry out assessments in their class by referring to the 2013 Curriculum." (Asst. P/18/01/2019).

Based on the data analysis of the interview, observation, and documentation showing that the assessment technique and type used in the science learning followed the 2013 Curriculum. The observation forms completed by three observers observing the science class revealed that the assessment technique and style aligned with the 2013 Curriculum.

J. Constraints in the Implementation of the 2013 Curriculum on Integrated Science Learning

The following information about some constraints in implementing the 2013 Curriculum-based integrated science was taken from the interviews with the science teachers and the vice principal for academic affairs.

> "Certainly, there are some obstacles in implementing the 2013 Curriculum. Frankly, I don't have enough output about the curriculum itself. We have been able to use a scientific approach in the science class. Still, physics, chemistry, and biology were broken down into units based on the basic competencies, although they should have been integrated with the same unit. As the upshot, we have difficulties understanding and applying the 2013 Curriculum" (Teacher-1/17/01/2019).

> "There are some limitations in implementing the 2013 Curriculum. First, there is a lack of information about the 2013 Curriculum. Secondly, the government is tardy in socializing the 2013 Curriculum, so we are affected by this. Thirdly, the students take time to understand the learning materials, so we must explain them very clearly. We always communicate with other science teachers in integrated science classes." (Teacher-2/16/01/2019).

Below is the statement from the assistant principal for academic affairs regarding the solution for the real constraints:

> "In practice, the teacher is supervised by the principal, and I am also often involved in the teacher's supervision in the teaching and learning process. I cannot deny that there are many obstacles in implementing the 2013 Curriculum in this school, including socialization, teacher burden due to the complexity of the 2013 Curriculum implementation, and low-motivated students. Despite these constraints, we will continue to find a solution and improve the learning in integrated science classes, especially for the betterment of this school" (Asst. P/18/01/2019).

The interview results reveal that this school strived to implement integrated science learning and evaluation optimally, as stated by the science teachers and the vice curriculum for curriculum affairs. However, teachers often face some constraints in teaching a science class, and therefore, the school continues to provide guidance and facilities to support the learning process. The science teachers also apply the best methods to improve the student understanding of the 2013 Curriculum-Based Science lesson.

Discussion

Based on the interviews, observation, and documentation results, the teachers seem ready to implement the 2013 Curriculum. In any situation, teachers must be prepared to apply the new curriculum. The teacher's readiness can be seen in their preparation and effort in teaching science, especially using a scientific approach. In this case, the school seems ready

regarding the teachers, learners, and the school. Besides, school management has provided teachers with training and seminars on implementing the 2013 Curriculum.

Based on the data analysis of the interview, observation, and documentation, the implementation of integrated science learning based on the 2013 Curriculum at the school met the expectations. The teachers used a scientific approach in the mixed science class. The assistant principal for curriculum affairs acknowledged it during the in-depth interviews, in which they mentioned that the science teachers are ready to implement science learning based on the 2013 Curriculum. The congruent observation results strengthened the statements from the key persons.

The questionnaires distributed to the science students of 7th grade revealed that students understood the lesson very well. In Science Class 1, 34 students filled out the questionnaire after learning. All of the students stated that they understood the reading. However, in Science Class 2, only 24 out of 34 students (70.6%) followed the study, while others (29.4%) said they needed help understanding it. Based on the analysis of the questionnaire data on students' understanding of integrated science learning, it can be concluded that most of the students understood the questions in the questionnaire's sheets. The interviews, observations, and documentation showed positive results in implementing the 2013 Curriculum regarding the learning methods and model.

This study is related to previous research conducted by Mardiah (2013). She found that, on average, the pedagogical competence of the junior high school science teacher in ternate was in the moderate category of 49.18%, while the remaining 34.34% were in the right type and 16.39% in the low class. She later suggested that developing pedagogical competencies needs to be continuously improved, especially by using various learning strategies that increase students' learning motivation. Indeed, academic skills are required competence teachers must possess so that the teaching and learning process can run well. That means teachers not only master the teaching materials but also apply various learning methods to help the students understand the lesson better.

Conclusion

The teachers' participation supports the readiness of the teacher to implement the 2013 Curriculum-based integrated science learning in training and coaching (4 to 5 training). The teachers are ready because they understand and apply the curriculum in their classes, fulfill the required competencies in integrated science learning, and provide quality learning tools. Besides having attended some training, the teachers have also received coaching. They show proper preparation for teaching and continue to improve themselves to fulfill the requirements of the new curriculum adopted by the school.

Implementing the 2013 curriculum based on integrated science learning can also be seen from the scientific approach used by the teachers when teaching science classes. In other words, besides applying suitable learning methods and models, the school's science teachers have used a suitable approach (scientific approach) and conducted a proper assessment in the class according to the 2013 Curriculum.

Conflict of Interest

The authors declare that there is no conflict of interest.

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