

Implementation of Inquiry-based Practical Activities in Natural Science Education: With Specific Reference to Primary Schools in Addis Ababa City

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Abstract
The study aimed to investigate the implementation of practical activities in natural science education in Addis Ababa primary schools. For this purpose, the study used a qualitative research approach. Specifically, it employed a qualitative descriptive case study design. Two purposefully selected primary schools were involved in the study. All grades seven and eight science teachers and students were the data sources in the study. The study showed that inquiry-based practical activities in science subjects are not implemented; teachers and students are not aware of the implementation of practical activities through inquiry-based strategies. There is a lack of professional training for teachers and laboratory technicians. Similarly, lack of materials and facilities, absence of motivation and guiding of students learning, lack of teachers' commitment, absence of science and technology companies to see the practice were found to be the major factors affecting the implementation of practical activities in science classes in the primary schools under the study.
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1. Introduction

Ethiopia has been working to ensure access and quality of education. Most conspicuously, the nation has emphasized science education and mathematics to strengthen student performance in science subjects because science and technology are the bases for development in today's contemporary world. Improving the quality of education is always an issue everywhere and at any time. As a result, the government of Ethiopia has taken multi-pronged measures to improve the quality of education in the country, with particular emphasis on science education (MoE, 2009). As stated in different documents, such as the curriculum framework of Ethiopia (2009), (MoE, 2010), (MoE, 2018), preparing students for their future life requires active classrooms and successful learning. This is because their integration in society later depends on their personal qualities and competencies, which to a great extent are products of well-organized and well-accomplished education involving a comfortable atmosphere of mutual understanding, collaborative, inquiry learning experience in all school subjects. To support this, the Ethiopian Federal Ministry of Education prepared strategies for improving science and mathematics education in Ethiopia (MoE, 2009). In this strategy, the Ministry of Education underlined that sustainable and all-around development of a country depends on accessibility and utilization of a scientifically and technologically literate workforce.

The Ethiopian curriculum seeks learners to develop their knowledge and skills in the science subject areas through laboratories, field visits, environment observation, models, demonstrations, drawings, solving problems and cases (MOE, 2010). Similarly, the current education roadmap document states that education is contributory to realizing the country's development goals through the application of science, technology, and innovations (MoE, 2018). Supporting this, Feyera (2014) stated that science education is the upward of scientifically literate society that understands how science, technology, and citizens influence one another and who can use this knowledge in their everyday activities. Science education should be taught in practice as it can be applied in students' everyday life, and its quality should not be compromised, for it has a lot to do with civilization.

Accordingly, science education should be supported by practical activities to inspire science learning, build up scientific and analytical skills, enable an enhanced acquisition and comprehension of concepts, build up a solution-driven pragmatic mindset, develop discussion and critical analytical skills, and introduce more rigors science research in schools. Thus, effective practical activities are supposed to enable students to bridge what they can realize and handle (hands-on practices) and scientific ideas that clarify their observations (brains-on activities). Making these connections is inspiring; hence, practical activities that make these links are more likely to succeed (Millar, 2004). Similarly, the strategy document for improving science and mathematics education in Ethiopia has the following to state about the importance of inquiry-based practical activities (MoE, p.32, no date);

Pedagogy is also essential, with the literature highlighting the importance of teacher content knowledge and teaching practices. These days, education literature promotes *integrating technology, content, and pedagogy for the efficient and effective delivery of STEM subjects. An inquiry-based, practical and relevant approach to STEM teaching and learning produces the most favorable outcomes.*

It is evident that practical activities have an indispensable contribution in effectively teaching hard sciences, especially for students at the primary level. High-quality science education provides the basis for compassionating the world through the specific disciplines of biology, chemistry, and physics. This fact does not seem accurate in most Ethiopian primary schools. Therefore, addressing problems and generating solutions for difficulties in their context is significant.

2. The Problem Statement

There is no doubt that inquiry-based practical activities in science at schools are widely accepted as a fundamental component of teaching and learning. Practical activity is at the heart of mastery of the scientific discipline, and it is believed that if there is no practice either individually or in a group, all that has been learned becomes inert knowledge. As Tilahun et al. (2010) stated, fostering inquisitiveness in science early in life and promoting high-quality science instruction in primary schools is very important. The effective way to enhance students' motivation and extend the knowledge in understanding theories and ideas about the natural world is through practical activity. Thus, science curricula are supposed to allow students to practice investigating authentic contexts of the students' environment. Similarly, deliberate efforts have to be made to attract and retain the students into the natural science class by appealing to the curiosity-raising element and discovery component of inquiry-based practical activities in the subjects (Millar, 2004).

Meaningful, practical activity is always embedded in discussing ideas that make it necessary to check observations and findings against experience and theory. Students may develop their knowledge and skill in their subject areas through their education using practical activities such as laboratories, field visits, drawings, environment observation, models, demonstrations, problem-solving (MOE, 2010). These are some of the techniques listed in the primary science education curriculum. However, research findings in different countries show that practical activities in science education are not up to the standard. For instance, Salmiza (2014) stated that because of the lack of practical implementation of the science curriculum, the enrollment of students in the science stream in Malaysia is becoming very low. Similar findings in Nigeria by Bimbola and Daniels (2010) forwarded that a large number of students learn a tiny aspect of science at the lower level of education as a result of poor methods of instructions and lack of materials for practical activities; in this situation, learning to tend to be by rote and copying of notes from the chalkboard, which makes the learning of science concepts very difficult. Ethiopia needs rapid improvement of science education and appears to have been prepared to resolve issues of quality development in science and technology through its existing education training policy and education development road map.

For instance, recent studies conducted by different local scholars (Ashebir & Bereket, 2016; Tolessa et al., 2016, Demisachew, 2017) on science education and implementation of science laboratory practical activities showed that the implementation of practical activities in secondary schools is low. For instance, Ashebir & Bereket (2016) conducted descriptive research to assess the practice and problems in science laboratory activities in the secondary school of Wolaita Zone (Southern Nations Nationalities People’s Region). The findings show that science instruction is not supported adequately by laboratory or practical works. This study concluded that the government should give special inspection and operative implementation strategies for the improvement and efficient ways of science teaching in schools in order to achieve the mission and goals of the existing education policy. A descriptive survey study by Tolessa et al. (2016) was conducted in the Oromia region to assess the status of the Biology laboratory, and practical activities in secondary and preparatory schools revealed that there was less implementation of laboratory practical activities in the schools.

Demisachew (2017) also conducted his research in the Amhara and Afar regions employing a descriptive survey to investigate teachers' practice and challenges of implementing practical activities in teaching chemistry using locally available materials. His study also investigated factors that affected practical activities in science education in some selected secondary and preparatory schools. The findings revealed that lack of laboratory rooms, inadequate supply of lab equipment, reagents, and facilities, absence of trained laboratory technicians and teachers, lack of commitment and interest of teachers, lack of regular schedule for laboratory activities, poor management, monitoring, and evaluations of laboratory activities, are some of the factors hindering the effective implementation of science practical activities. The studies mentioned above investigated practical activities, focusing only on laboratory activities. The findings also indicated that practical laboratory activities were not given the necessary concern in the secondary schools. Although relevant equipment and reagents are necessary, they were not adequately found in the schools.

In line with this, a research study by Tilahun et al. (2010) on the status of science education in the primary schools of Addis Ababa indicated that students had not conducted practical activities during science lessons. The study also concluded that all-rounded and general intervention by addressing students, teachers, school management, resources, curriculum, instruction, and assessment is obligatory to bring a scientifically and technologically knowledgeable community of Addis Ababa. Most of the research conducted in the area is focused only on the implementation of laboratory activities in natural science subjects in secondary schools. Whereas the science education curriculum in primary schools emphasizes the inquiry science practices and the inquiry-based practical activity implementation in primary schools is overlooked. To our knowledge, there are no studies on the implementation of inquiry-based practical activities in natural science subjects in upper-primary schools of Ethiopia, in general, and in Addis Ababa in particular. Due to this, we are motivated to research the implementation of inquiry-based practical activities in science education at upper-primary schools (grades 7and 8) of Addis Ababa.

Therefore, the study's objective was to investigate the implementation of Inquiry-based Practical Activities in Natural Science Education in the context of upper primary schools in Addis Ababa. More specifically, the study aimed at a) assessing the current implementation of practical activities in primary schools of Addis Ababa, b) assessing teachers' and students' awareness about the implementation of practical activities in the primary schools, and c) identifying the major problems that hinder the implementation of practical activities in primary schools of Addis Ababa. Accordingly, the study was conducted to answer the following primary research questions:

1. Are practical activities being implemented in natural science education in upper primary schools?
2. Are teachers and students aware of natural science education practical activities in the upper primary schools?
3. What major factors hinder inquiry-based practical activities in upper primary schools?

3. The Concept of Practical Activity

Today, the natural science curriculum is designed mainly based on inquiry-oriented instruction, which is about teaching science education through practical activities. Also, inquiry-based pedagogy can be effective if science teachers are supported with adequate laboratory facilities, sufficient science equipment, and high professional qualities. As a result, students become active participants in their learning through exploring, observing, experimenting, and practicing in the teaching and learning process. This can enable them to participate in various appropriate activities that enhance their participation in their learning.

Practical activities in science education effectively enhance students' motivation and extend their knowledge in understanding theories and ideas about the natural world. Students also prefer practical activities to any other learning activities. Modern teaching methods recognize that there is a need to give students the chance to think about what they are being taught or what they are learning (MOE, 2009). This means it is essential that teachers do not spend whole lessons talking, but plan in opportunities for class discussions in which students can exchange ideas, resolve misunderstandings and make sense out of what they are listening to, or engage in a variety of different activities which allow them to construct meaning for themselves out of the information they are receiving. Similarly, Balta (2015) stated that classroom practice provides opportunities for students to learn practical skills in a setting where they can observe, practice, explore and gain mastery through hands-on use of tools and techniques. Moreover, systematic planning of instruction is crucial since it is part of the preparation to catch students' attention and motivate them to take part in instructional activities.

Lunetta et al. (2007) also argue that the term inquiry in school laboratory practices has been ambiguously used. On the one hand, using terms such as "inquiry science teaching," which may refer to teaching science as inquiry, helps students understand how scientific knowledge is developed. On the other hand, teaching science through inquiry having students participate in inquiry investigations to help them acquire more meaningful conceptual science knowledge.

As the literature mentioned above indicated, practical activity does not mean only laboratory activity. Similarly, the natural science syllabus entails the importance of practical activities in students' overall academic performance through various practical engagements with the authentic contexts in their environment (MoE, 2009). Therefore, inquiry-based practical activity in science subjects under this study includes students' observing their environment, using different materials in their local context, asking questions, finding answers for their questions, applying research, manipulating natural objects related to science practice to evaluate their activities, engaging in laboratory activity, drawing conclusions, exchanging ideas with their classmates or teachers and develop a positive attitude to others.

These practical and real-life interactions help learners develop their knowledge, skills, and attitudes from their real-life observations. It can also enhance students' critical thinking and problem-solving skills. Thus, implementing the desired goals of the natural science curriculum in schools using inquiry-based practical activities is essential.

4. Methodology

In order to attain the objective of the study and answer the research questions, a descriptive qualitative case study was employed because it is appropriate to answer a descriptive question, what happened and focus on a unit of study known as a bounded system like individual teachers, classroom or school (Gay, 2012).

4.1. Context of the study area and sources of data

Two primary schools were purposely selected for the study, both in Addis Ababa city administration Arada Sub-city. The first one is Menelik II Primary School, established in 1905, and currently, the school has 191 grade 7 & 8 students and six science teachers. The second school was Atsenaod primary school which was shifted from a community school to a governmental school in 2008. Currently, this school contains 235 grade 7& 8 students and seven science teachers. The data sources for the study were primary school natural science teachers, Grade 7& 8 students, and laboratory technicians. In implementing and practicing school activities, teachers and students are direct involvement, and they are ideal subjects to identify problems hindering the learning and teaching process. In other words, no other body can suggest better and possible solutions other than teachers and students who are in the actual implementation process of practical activities. The need to select laboratory technicians as a data source was evident due to their involvement in the practical strategies of the teaching-learning process on natural science curriculums. They were selected due to their responsibility as a decision-making body in facilitating how the program goes harmoniously and assisting teachers in the implementation. However, during observation, it was learned that those science teachers had been playing laboratory technicians' role in addition to their actual role as a teacher. In addition to this, supplementary data were collected from other sources such as lesson plans, laboratory reports, and assessment checklists. The data gained through these supplementary sources were used to triangulate the information gained from interviews and observation.

The two upper primary schools were purposefully selected for their distance and acquaintance advantages to the researchers. The three separated/natural science subjects (Biology, Chemistry, and Physics) were also selected purposely to see the implementation of the inquiry-based practical activities since the researchers' educational background and teaching experience is related to natural science subjects as they constitute the area of science education in primary schools. One student was randomly selected from each section, and six students were involved in the focus group discussion. All teachers and laboratory technicians were involved in the study. Three samples of each document (lesson plans, laboratory reports, and students' assessment checklists) were observed to get supplementary data to implement the practical activities in the natural science subjects in the schools.

4.2. Data Gathering Instrument

In order to gather information, we used four kinds of data collection instruments that were believed to open room for triangulation and provide ample information. Accordingly, classroom observation, focus group discussion with students, interview with teachers, and laboratory room observation was used to get in-depth information on the actual practices of practical activities.

4.2.1. Classroom Observation

Classroom observation was employed to obtain data about the actual practice of practical activities in the natural science curriculum. Sayed & Naylor (2014) noted that classroom observation is precious as a direct measure of teacher worth as they are usually the most authentic, reliable, and substantial evidence. Observation has occupied an important place in descriptive educational research that focuses on recording authentic life situations (Sayed & Naylor, 2014). Accordingly, the researchers used observation to scrutinize what is going on in the classroom to investigate the extent of the implementation of practical activities in natural science subjects in the primary schools of Addis Ababa. Thus, the data obtained through classroom observation helped to see the interaction of students and teachers. The observer sat in the participants' classroom during their regular time and used an observation checklist to record what was going on, heard, and experienced during a series of sessions. Twelve classroom observations were made. In addition, the data from laboratory observations and document review (lesson plans, assessment checklists) helped to consider the instructional practices related to the practical activities of teachers. This helped triangulate the information gained from various tools and objectively understand the implementation of practical activities in the natural science classrooms.

4.2.2. Focus Group Discussion with students

Focus group discussion was another tool employed to obtain necessary data from students. Here, questions were prepared to understand their awareness of practical activities in natural science education, what strategies their science teachers practiced in the schools, what practical activities they applied, and what problems they faced during the teaching-learning practice of science subjects. FGD was held in both schools. The participants were randomly selected from each section considering gender balance: three male and three female students. This was done by first separating the list of female and male students of each section and then randomly selecting three students from each sex category. The analysis was done in five thematic categories based on the focus group discussion guideline items. Therefore, a total of 12 students participated in the FGD. The FGD was also audio recorded with the participants' consent and a note taken during each session.

4.2.3. Interview with teachers

Interview permits greater depth of response, which is impossible through any other means. This approach is essential for its flexibility in outlining and questioning to understand the interviewee's interpretations are critical in explaining and understanding proceedings, patterns, and behavior practices (Bryman, 2012). In addition, it is used to get reliable information on the actual practice of inquiry-based practical activities in natural science education. Because of this, the unstructured interview was used to obtain in-depth data that was useful to triangulate data obtained through classroom observation, students' focus group discussion, and laboratory observations. All discussions in the interview were recorded using audio equipment.

4.2.4. Laboratory Observation

The other data gathering instrument under this study was a laboratory observation checklist that was used to see the actual implementation strategies and school contexts by observing the environmental setup, which is found to be very crucial in this study. Therefore, this tool was used to see the implementation of practical activities and to explore the extent to which science teachers consider the strategies of practical activities during their planning of the lesson. These laboratory observation and document review checklists were prepared based on three major themes related to the implementation of practical activities in natural science subjects. The first laboratory checklist contained five questions related to the availability of laboratory equipment and the appropriateness of the facilities in the laboratory. Secondly, thirteen questions related to factors affecting the implementation of practical activities in the laboratory are included. Thirdly, ten items were designed to get data from the planned laboratory plans, subject annual and weekly plans to identify the extent to which teachers used the strategies of practical activities. Documents were also used to check and compare what the teachers say they know with what they do in class.

4.2.5. Procedures of data collection and analysis

The data-gathering instruments were developed, taking into account the study's objectives and the reviewed literature. Before using the instruments for the main study, it was reviewed by different colloquies and modified based on the comments. Based on the comments, the tools were revised and improved to fit the purpose. The necessary permission was obtained from the respective school principals to study in the respective schools. Then, data were collected using tools prepared. Primarily, classroom observations were conducted while teachers were teaching practical activities in their classes. This process preceded other means of data collection to observe practical lessons in their natural context. Secondly, focus group discussion was administered with the students to get information about their awareness and the extent of implementing inquiry-based practical activities. Thirdly, interviews were conducted with teachers to gather information about their awareness and factors affecting the implementation of practical activities in their subjects. Finally, data were collected using laboratory observation checklists by observing the documents to get data on the relevance of the lesson plans, laboratory reports, and student assessment checklists to the practical activities in the science curriculum in the selected primary schools. The anonymity of the participants and confidentiality of the data obtained from participants were reserved. The qualitative data from classroom observation, interview, focus group discussion and laboratory observation, and document review was qualitatively described and jointly discussed by supporting scholars' views and research findings.

5. Results

5.1. Implementation of Practical Activities in Primary Schools

In order to collect the information on the actual teaching of the science curriculum in primary schools, the researchers produced a checklist that has eighteen questions, which are believed to have a semantic connection with the teaching of practical activities. The checklist was adapted from literature, particularly from the Work of Robin Millar (2009), the Practical Activity Analysis Inventory (PAAI). The classes of 7 science teachers who teach Biology, Chemistry, and Physics in the selected schools were observed. Altogether, twelve instructional periods were observed. Each period lasts 45 minutes. The recorded lesson and observed events were tabulated and described. The data obtained through classroom observation helped to see everything in the classroom, including students' engagement, teachers' involvement, and materials related to the planning and implementation of the science curriculum in the natural environment. The data obtained through classroom observation are presented in three stages: pre-lesson activities, while-lesson activities, and post-lesson activities based on the structure of the observation checklist. In the table below, six questions were listed under the Pre-Lesson phase.

Table 1: Pre-lesson activities

No	Instructional activities of teacher and students	Descriptions			
		NO	NI	SU	EU
1	Revision of the previous lesson through inquiry questions.	12	-	-	-
2	Gives a chance to students to answer questions.	8	4	-	-
3	Introduces the day's lesson by giving examples related to daily life activities.	12	-	-	-
4	Encourage students to ask and answer questions	9	3	-	-
5	Students actively participate in asking and answering questions	2	3	7	-
6	Facilitate and shape students' answer	12	-	-	-

Key: No= not observed, NI= needs improvement; SU=satisfactorily used; EU=effectively used

These questions focus on the procedures teachers are expected to implement in practical activities, such as asking inquiry questions and introducing the lesson by motivating students to answer or display their knowledge to bridge the past lesson with the present one. However, the observed teachers started the day's lesson by writing notes on the blackboard, except in the two observed lessons. In the two observed lessons, the teachers tried to ask their students theoretical questions concerning their environment. From this result, we can deduce that implementing practical activities through inquiry as planned in the syllabus is not implemented. Similarly, seven items were used to assess activities during the actual delivery of the lesson. This helped to observe students' engagement in practical activities and their teachers' assistance in the process.

Table: 2. While lesson delivery activities

No	Instructional activities of teacher and students	Descriptions			
		NO	NI	SU	EU
1	Present the lesson through explanation/lecture	12	-	-	-
2	Students passively listen to the teacher's presentation	3	2	7	-
3	students actively participate in peer/group-discussion	12	-	-	-
4	students actively participate in group reflection	12	-	-	-
5	Teachers use teaching aids to support the lesson through demonstration	12	-	-	-
6	The teacher gives a chance for students to demonstrate	12	-	-	-
7	The teacher gives tasks, such as classwork and homework, to students	4	-	-	-

Key: No= not observed, NI= needs improvement; SU=satisfactorily used; EU=effectively used

In the table above, items related to practical activities such as requesting students to discuss the topic by relating it with their environment, showing models for students, asking students to display the model, reflecting their idea, discussions to share their experiences were expected to be implemented by students and teachers. However, during the observation, the practical activities expected from teachers and students were not implemented in all of the observed classrooms, except for three classrooms where students reacted to the questions raised from teachers, although the approach was in the form of one-way communication. Whereas practical approach questions were raised from both directions, the answer was also generated from students guided by teachers. During the interview, teachers indicated that they give notes and students coping the same from the blackboard; teachers give notes, and students receive the information-theoretically. Similarly, during the focus group discussion, students reflected those practical activities in the natural science subjects were limited to taking notes and listening to the teachers' presentations. Practical activities differ considerably in what they ask students to do and what they teach. If we are interested in the effectiveness of practical Work, we have to consider specific practical activities that we use or plan to use. According to (Millar 2010), many science teachers believe that student practical work leads to better learning because we all understand and remember things better if we have done them ourselves. In the Post lesson activities phase**,** five items that deal with assessment (classwork and home take) are included.

Table: 3. Post lesson activities

No	Instructional activities of teacher and students	Descriptions			
		NO	NI	SU	EU
1	The teacher gives tasks, such as group works and assignments, for students	12	-	-	-
2	Teacher plan laboratory lessons in his/her annual & monthly plans from the syllabus	-	12	-	-
3	Teacher records project works done by students	12			
4	Teacher promote students to practice field works	12	-	-	-
5	Teacher promotes students to write laboratory activity reports	9	3	-	-

Key: No= not observed, NI= needs improvement; SU=satisfactorily used; EU=effectively used

The items in Table 3 focused on issues expected of the teachers and students to practice the practical activities in the classroom or outside the classroom. In the observed classrooms, teachers did not guide or give extra assessment/activities in all classes or did not collect any project work or report from the previous lesson. Therefore, we can assert that teachers focused on explaining science subjects theoretically to students rather than engaging them in practical activities. Similarly, the interaction of teacher and students is not as written in the science curriculum as it requires practical inquiry. A similar finding was also found from teachers' interviews and student focus group discussions. The data secured from observation and teachers' interviews showed that the interaction of the teachers and students in the observed schools did not consider the practical activities in the lesson delivery. However, studies claimed the purpose of practical activities to help students develop their knowledge and understanding of the natural world differ considerably in learning demand. The way teachers use practical activities aims at helping students develop their understanding of scientific inquiry. It often implies that practice makes perfect and that students will get better at planning and conducting their investigations simply through practice (Millar, 2010).

5.2. Teachers' and Students' Awareness about Practical Activities in Primary Schools

In this part of the analysis, data obtained through the focus group discussions and interviews of teachers were analyzed. Two focus group discussions were held in each school, with six students in each discussion, and five teachers participated in the interview. Primarily, participants were asked about the kind of major practical activities that their science teachers use during science lesson delivery. The ideas forwarded in response to these items were similar, except for expression differences. In each FGD session, students mentioned several specific activities that can be included in one of the following general lists of activities. They said that asking oral questions, explanation, writing notes on the blackboard, correcting class works and home works, giving assignments, and sometimes laboratory activities. As can be deduced from the above analysis, most of the students did not clearly distinguish practical activities from theoretical ones since most of the activities identified as practical activities are not practical ones. This can also indicate science teachers' failure in regularly using practical activities in their delivery of the science curriculum in the sample schools.

Students were asked to list down some of their preferred practical activities they use or want to use while learning despite their teachers' interest. They said they prefer to use homework, discussion, presentation, laboratory-oriented activities, copying notes from a textbook, and other writing assignments. This data can be helpful to conclude that there is a partial mismatch between the way teachers teach practical activities and the way students want to learn practical activities during science lessons. However, most of the practical activities students listed as their preferred practical activities are not practical activities. Students did not mention field visits, demonstration, modeling, inquiry-based investigation, and other ways of teaching practical activities in both cases. This again puts their understanding of science practical activities under a big question mark.

Participants were asked how their teachers motivate them to learn practical activities during science classes, and they forwarded several responses that may or may not be helpful. They said their teachers motivate them to learn carefully, read books, answer questions, love sciences subjects, and give different quizzes and tests. This indicates that teachers' effort in motivating students to learn practical activities effectively did not go beyond advising and assessing them. From this data, it can be deduced that teachers are not adequately motivating their students to participate in practical activities in their interest. Teachers also did not relate practical activities with students' environment.

During the focus group discussion, participants were asked if there is a laboratory in their schools, and they confirmed the existence of a laboratory room. However, most of the students from Minilik Primary School stated that the laboratories have insufficient equipment and facilities; as a result, they do not feel there is a laboratory and are not motivated to use it as they cannot get the material they want. The participants from AtseNaod School also share this concern though the laboratories in the school are relatively better. This indicated that students are not confident of their laboratories' quality, which affects their interest in engaging in science activities. Furthermore, the participants were asked about their monthly frequency of use of the laboratories to support science lessons. In response, students from both Primary Schools said they went to the laboratories once or twice a semester, but they did not go to it every month. From these findings, it can be concluded that laboratories are not giving the expected services for several reasons, and students are not getting practical experiences.

On the other hand, during the interview, teachers were asked about implementing the natural science curriculum in their schools, and they forwarded various means of implementing it. They said they use microscopes and local materials, lecturing methods, writing notes, laboratory presentations, and question and answering as a means of practicing science. These methods of delivering science lessons are acceptable, but teachers did not mention most of the approaches used to implement practical activities in science classes. This can indicate that teachers are more concerned about theoretical knowledge and skills than their practical faces.

Teachers were also asked to mention the method they prefer to deliver the science curriculum, and they mentioned a few methods commonly used to teach theoretically. They stated that giving explanations related to students' environment, lecturing, and question and answering are the methods they prefer to teach science classes in their schools. This shows teachers' limitation in implementing the natural science lesson using variety of methods suitable to deliver practical activities; they are limited to using few methods that do not encourage the use of practical activities. Furthermore, teachers were asked about the methods they frequently use to teach practical activities in their classes. They mentioned question and answering, lecture method, demonstration and note making as the methods they frequently employ to deliver their lessons. Teachers also stated that they employ these methods because they are easy to deliver the lessons. This view shows their disregard in teaching practical lessons and using methods that are used to deliver practical activities.

Teachers were asked to briefly indicate the method they think is simple to science lessons, and almost all of them said teaching students using materials and videos from the internet are the simplest ones. They said that downloading materials and videos makes life easy as it explains everything on it and does not require their effort. This is one of the frustrating findings in this study. This finding is shocking since teachers are trying to devote less effort to teaching by simply providing their students with ready-made lessons. This is one of the drawbacks of technology on the teaching-learning process in general.

Similarly, teachers were asked to list down some of their strategies to implement practical activities. They said they provide their students with homework, classwork, group assignment, observation, note provision, and technological materials from the internet to implement practical activities. Most of the strategies the teachers mentioned are taken from the traditional teaching approach, so they are not the strategies of practical activities such as field visits, reflection, model preparation, demonstration, project works, discussion, sharing of experiences, laboratory practices, and peer teaching, etc. They reflected that the practical activities are conducted in laboratory rooms only. Correspondingly, during the focus group discussion, students reflected similar points with teachers. Thus, the awareness of teachers and students in these schools regarding the implementation of practical activities through the practical strategies of scientific inquiry is poor. In line with this finding, a study conducted by Awelani & Ramodungoane (2014) on teachers' classroom practices by focusing on how they conduct practical Work in science classrooms showed that teachers conducted practical work tasks within the explanation model because of their view and understandings. This has been found that teaching science without practical activities affects students' interest in science disciplines, resulting in less student enrollment in science class.

5.3. Factors Affecting the Implementation of Practical Activities

During the implementation of any program, it is evident that problems may occur. Thus, the above results showed that practical activities are not implemented in primary schools. Thus, it is essential to think that practical activities may be affected by some factors and shortcomings during their implementation in the actual classroom situation or outside the classroom. Questions were raised under each data gathering instrument to assess factors hindering the implementation of practical activities in the science curriculum. Furthermore, the teachers' interview and focus group discussion show that lack of commitment, coordination, facilities, professional staffing, interest from the students' side are significant problems hindering the effective implementation of practical activities. Furthermore, they mentioned language proficiency problems and the absence of science technologies as factors affecting its effective implementation.

Interview with teachers assured that the laboratories in their schools are not well equipped. They said the laboratories need to be revisited for they lack the necessary equipment, have space and arrangement problems, and lack laboratory technicians. They also mentioned lack of commitment from the teachers' side, coordination, facilities, professional staffing, interest from the students' side as some of the major problems hindering the effective implementation of practical activities. Here, it is worth emphasizing teacher-related factors than others as most of the gaps in the implementation are teacher originated or teacher supported.

The students who participated in the FGD indicated that teachers' reluctance to motivate and engage them in practical activities was the main factor for their poor engagement in practical activities. Students said teachers are not interested in designing and delivering practical lessons. They doubt their teachers' ability to design and deliver practical activities by giving reasons for the lack of chemicals and equipment to teach them practically in the laboratories. Students mentioned the lack of adequate time allocated to practical activities as another factor. Furthermore, students said that the interruption of electric power is one of the factors as it disturbed their classes when they rarely go to the laboratories. Therefore, it can be said that several factors are affecting students' involvement in practical activities, and most of these factors are teacher-related.

During observation, it was observed that there was a laboratory with a laboratory technician, but the facilities and equipment were not sufficient. They did not motivate teachers and students as they were not appropriately arranged and did not get sufficient materials. However, in Minilk II Primary School, a laboratory room was available, but no laboratory technician and enough equipment were available. This affected the effective implementation of practical activities set in the subjects. As a result, the motivation of teachers and students to implement the practical activities was dubious. Similar obstacles hindering the effective implementation of practical activities in both schools were observed. In both cases, insufficient laboratory equipment, lack of facilities, lack of teachers' commitment, time, power supply, and lack of practical experience are the common barriers hindering the effective implementation of practical activities.

Furthermore, from the lesson plans, it was observed that teachers did not include methods that are typically used to teach practical activities in science classes. They focused on the traditional methods such as explanation, lecturing, writing summarized notes on the blackboard, giving tests and quizzes. So, this implies that there is a gap in organizing and using laboratories in schools. This may affect the overall implementation of the science subjects.

To sum, the implementation of practical activities in the science curriculum is not implemented as to the standard in the policy, and lack of facility and adequate professional training are affecting the implementation of inquiry-based activities in the schools. In addition, teachers' and students' low awareness of practical activities influence its implementation. The results of the current study largely concur with similar findings by Tolessa M. et al. (2016) and Demisachew (2017). The mentioned studies showed that the significant factors affecting the implementation of practical activities in Ethiopian schools are lack of laboratory rooms, inadequate supply of lab equipment, reagents and facilities, absence of trained laboratory technicians/teachers, lack of commitment and interest of teachers, lack of regular schedule for laboratory activities, poor management, monitoring and evaluations of laboratory activities, absence of a system for grading and assessment of laboratory examinations.

5.4. Conclusion and Implications

The Ministry of Education underlined the importance of the natural science curriculum chiefly based on inquiry-oriented instruction, which is about teaching science education through practical activities. Inquiry-oriented pedagogy can be effective if science teachers are supported with adequate laboratory facilities, science equipment, and high-quality teachers to support students technically. Using this approach, students should become more active participants in their learning through exploring, observing, experimenting, and practicing in teaching and learning methodologies and enable them to participate in various appropriate activities to enhance students' participation in their learning. Based on the analysis of the data, the following conclusions are derived;

a) Regarding implementing the practical activities in the natural science (Biology, chemistry & physics) curriculum in the observed schools, practical activities are not adequately implemented. They implement the curriculum by showing microscopes and local materials in the students' textbooks. Lecturing methods, writing notes, and question and answer are powerful strategies teachers apply. However, these methods of delivering science commonly used to implement practical activities in science classes do not typically engage students in practical activities. This can indicate that teachers are more concerned about theoretical knowledge and skills than their practical faces in an authentic world. Therefore, the strategies of practical activities in science subjects such as observing their environment, using different materials in their local context, asking questions, finding answers for their questions, applying research, manipulating real objects related to science practice to evaluate their activities, drawing conclusions, exchanging ideas with their classmates or teachers and develop a positive attitude to others are not implemented in the primary schools under the study.
b) The other issue addressed in this study was the teachers' and students' awareness of the implementation of practical activities in the natural science curriculum in the two schools. The data secured from the respondents reflected those teachers are aware of the practical activities in their subject though they limited them only to the laboratory-related activities. This indicated that teachers were not aware of all the techniques and strategies of practical activities. Because the teacher under the study reflected that they assumed practical activity strategies only as of the laboratory practice, students also reflected those practical activities are limited to question and answer. So, students are not aware of the practices and implementation of practical activities during their learning in school.
c) Regarding factors affecting the implementation of practical activities, the study revealed that there are factors related to the teachers' awareness and implementation of practical activities, lack of professional training for teachers and the laboratory technicians, lack of materials and facilities, lack of motivation and guiding of students learning, lack of teachers' commitment, absence of science and technology companies to see the practice in the context of schools.

Practicing practical activities in the science curriculum requires appropriate human, suitable, and sufficient material resources. Without fulfilling these essential elements, trying to implement the curriculum is challenging. Therefore, based on the evidence from this study, the following implications have been forwarded:

a) Teachers are still using the lecture method or explanation of the content theoretically. Teachers should go beyond the dissemination of content, they are supposed to be teachers of how to teach how to facilitate the contents, and they should serve as role models for their students. Thus, teacher-educators should prepare to model good practices for their students. They have to update themselves on appropriate pedagogies for teacher education and use them in their classrooms. Therefore, the education professionals should evaluate themselves and go to the actual context of the school environment to support teachers on how to teach the curriculum as a facilitator and as coaches in inquiry learning.

b) The awareness of teachers and students on the practical activities in science education is limited to the laboratory-related activities only when there are other various kinds of activities. Therefore, it is essential to help teachers know the different practical activities essential to teaching science subjects by preparing professional training for teachers and students.

c) Without fulfilling the necessary human and material resources, the implementation of practical activity is valueless. Thus, giving priority to arranging and overcoming the shortcoming in the schools is very important to improve the education quality system/ quality assurance in the schools.

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