

Facilitators' guide for implementation “Lesson Study”



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Preface

What, exactly, is lesson study? Lesson study is not a special thing. Rather, it is the Plan-Do-Check-Action cycle that you carry out on a daily basis, but applied to lessons. Consider, for example, how you go about cooking. First you decide on a menu and prepare the ingredients, utensils and so forth. Then you do the cooking, after thinking out what order to cook the items in. Having tried this out once, the next time you will no doubt try to find ways of making the food taste better as efficiently as possible, by for example coming up with improved techniques of chopping the ingredients, changing the order in which the ingredients are cooked, altering the durations for which they are cooked, using different amounts of seasonings, and referring to the opinions of people who have eaten the dishes. Lesson study is the same kind of thing. It is an activity in which one plans lessons, carries them out, and reflects upon them so as to make improvements. But lesson study is not something that one carries out by oneself. It involves mutual collaboration of colleagues at a school, in framing lesson plans, observing each other's lessons, and producing improvement proposals for better lessons.

This guide has been prepared for a readership of leader teachers at schools. Using this manual will enable such teachers to practice lesson study within their schools or in clusters.

The manual is composed of sections that explain for you, a leader teacher, what lesson study is about, as well as sections giving the guidance needed to hold workshops aimed at other teachers, and handouts for such workshops. Although the subjects taken as examples in the manual are science and mathematics, the basic content can be applied to other subjects.

Content

Preface

Module 1 Experiencing Lesson Study-----3

Module 2 Open lesson and Post Lesson Conference

– first steps – -----19

**Module 3 Lesson Study by Team in Response to the
Challenges -----26**

Module 1 Experiencing Lesson Study

1-0 Object of this Module, and points for attention

The object of this module is to give teachers with no experience of lesson study an understanding of its significance and the ways to apply it, by having them experience in simulated fashion a lesson observation and subsequent post lesson conference. In particular the object is to have such teachers think about what kind of comments at the post lesson conference will be accepted by their fellow teachers and be of service for lesson improvements. The teachers are adults, and reciting a catalog of faults at them will be counterproductive. By using this module, leader teachers will be able to hold workshops on lesson study for other teachers. As much as possible, the workshops should be conducted in a participative format, with the participants encouraged to express themselves.

Things to prepare: A television set, or a PC and projector, able to show DVD videos (if none is available, use transcripts of the videos), Worksheets, Lesson observation sheets, Blackboard and chalk (or flipchart and marker pen), Paper for writing feedback, Paper for creating a register of participants.

1-1 Observing the lesson video: What to observe for (teacher's utterances, blackboard use, and support; students' responses and behavior)

Ahead of watching the video, ask the participants questions about the points to observe in the lesson, and have them share their views. If the participants are numerous, divide them into groups of four or so, have the groups discuss the points to observe, then have a representative from each group announce the group's views. This is so as to have everybody participate in the discussion. Pool the points made in the responses of the various participants, by writing them on the blackboard or flipchart. You should expect: points concerning the teacher's actions, such as utterances, blackboard use, question posing, and touring around desks; points concerning the students' behavior, such as utterances, responses to questions, and participation in student activities; points concerning the structure of the lesson, such as introduction, development and ending; and evaluatory points such as grasp of the students' existing knowledge, and assessment of the degree to which students achieve the tasks.

Next you should hand out the lesson observation sheets and give an explanation of them. In lesson observation it is important to record the facts. Facts concerning the points just determined should be recorded as they arise, under the headings of teacher actions/behavior, student actions/behavior and so forth. It is advisable to have each of the participants write down their interpretations, queries and suggestions together with such facts.

Two videos have been prepared for this module. One shows a lesson prior to conducting of lesson study, and the other shows the lesson after lesson study has been conducted. Introduce these videos simply as “Lesson 1” and “Lesson 2”, without giving the participants any background information – let them do the observation first.

1-2 Analyzing the lesson: what was good, what needs improvement

Have the participants analyze the lesson on the basis of their observation results. They should enter their observation results in the worksheets.

1-3 Comments on the lesson-presenter

Have the participants make comments on the lesson, on the basis of their observation results. So as to have all of them speak – to the extent possible – have each of them comment on a single item, one person at a time. Also, instruct the participants to speak as if making their comments to the lesson-presenter. The facilitator should record the comments by compiling them on the blackboard or flipchart. First obtain comments on what was good about the lesson, and when those have finished, move on to the issues and then to proposals for improvements.



1-4 Lesson improvements from viewpoint of comments (comparing the two lessons)

The two lessons that the participants have observed are given by the same teacher, one before and the other after the teacher has experienced lesson study. Have the participants figure out which is which. Elicit their views on this, including why they think so. Then inform them that Lesson 1 is pre-experience, and Lesson 2 is post-experience, and have them comment on what aspects have been improved in Lesson 2. Also have them consider whether the proposals that they made are reflected in the post-experience lesson (Lesson 2).

1-5 Thinking about comments from the lesson-presenter's standpoint

Whether the efforts of teachers trying to improve lessons will bear fruit depends on whether their lesson proposals are accepted by the teachers giving the lessons. Conduct a role-play of a post lesson conference, with participants divided into the roles of lesson-giver, observers and facilitator. In the role-play, have the comments made in 1-3 read out in the order good points, followed by points needing improvement, followed by improvement suggestions, with the facilitator giving the lead. Create a discussion on how to make comments that are likely to be accepted by lesson-presenters.

1-6 Ending

Here you should look back over what has been learnt in this workshop, and give summaries of the significance of lesson study and managing a post lesson conference. Have the participants write their feedback down in the sheets prepared for the purpose. Also have them make entries in the participant register.



Worksheet 1 for “Experiencing Lesson Study”

Date: / /

Place:

Participant's name: _____

1. When you observe the lesson in order to give advice, what kind of points will you focus attention on in the observation? Write your ideas on this below.

2. What are your group's ideas in response to the above question? Write your group's ideas below.

3. Summary

Lesson Observation Sheet

Observation date & time _____

School _____

Subject _____

Grade _____

Teacher _____

Students: Boys _____ Girls _____ Total _____

Time	Teacher's actions/behavior	Students' actions/behavior

Reference Document 1-1: Sample of Completed Lesson

Observation Sheet

Observation date & time 2007/4/18 School ABC Junior High
 Subject Mathematics Grade 9
 Teacher Mrs. Smith Students: Boys 30 Girls 28 Total 58

Time	Teacher's actions/behavior	Students' actions/behavior
0	Writes "Geometry Measurement" on blackboard. Explains that "geo" = earth and "metry" = measurement, and that measurement is important for making the clothes on one's body, and houses.	
2:00	Hands worksheets out	
5:30	Explains worksheets	
6:00	Tours around desks	Work on worksheet.
11:00	Calls a student to front and has him solve Problem 1	Representative student gives solution.
12:00	Shows that quadrangle in question is a rectangle, and instructs to measure length of circumference. Tours around desks.	Work on problem on their own.
18:00	Instructs to calculate circumference of a square, and tours around desks.	Representative student gives solution. Work on problem on their own.
22:00		Representative student gives solution.

Time	Teacher's actions/behavior	Students' actions/behavior
23:00	Checks answers, then defines word "perimeter" meaning length of circumference of a figure, and derives equation for finding the circumference length of a rectangle. Hands worksheets out. Explains the problem.	
33:00	Poses questions to students on problems related to circumference length of a rectangle, then gives step-by-step model solution while	Respond to questions as appropriate.
41:00	rectifying mistaken conceptions. Poses questions to students on circumference length of a square, then gives step-by-step model solution	Respond to questions as appropriate.
45:00	while rectifying mistaken conceptions. Explains advantages of equation while showing tape measure. Instructs students to solve problem on their own. Gives support by touring around desks	Work on problem on their own.
61:00	Reviews today's learning and explains	
62:00	meaning of activities. Ends lesson.	

Reference Document 1-2: Transcription of Lesson 1

Presenter: We are going to take our and welcome to our today's lesson and hope that everyone is going to participate. First I start with a story and here it goes. There was a white guy and a black guy I mean a European and an African. As they were walking along the river suddenly a certain animal was scared by their movement and when they were approaching it, it quickly went into the water and the African said, oh hippopotamus!! And the European asked what he was saying and repeated the same words and the European repeated the same word in a correct way and not the way he pronounced it in the African way. Our topic for today is OUR PLACE IN SPACE. The subtopic being;

1. ROTATION.

I will give some hand outs whereby we are going to make some drawing according to the instructions as shown in handouts. (Distribution of handouts). We all look at figure No.1 in our handouts. It states that study the above diagram and present the relative movement of the sun. Point to be noted it must also represent the relative movement of the sun 2nd the shadow of the observer considering the size of the shadows in different positions of the sun from morning to evening. Also take note of the midday. This is how we are going to do; we are going to make a representation on a northern hemisphere view of the sun and earth. You draw with pencils the figure of the sun during the morning on northern hemisphere point of view. I will give an example so that we may all know what am saying. (Drew an example of the sun). What I would like you to do on the figure shown is for you to draw a sun or anything that can represent the sun in the morning on the northern hemisphere. We have north and southern hemisphere but let us consider the northern hemisphere. I will go round checking. (Started going round).

Learners: Started the exercise of drawing.

Presenter: Most of us have drawn the position of the in the morning on the northern hemisphere. 2nd what to do is for you to draw the shade of a person/viewer standing on the northern hemisphere or positioned on the northern hemisphere taking into consideration the time and position of the sun in the morning.

Learners: Start drawing the second activity.

Presenter: Well, number 2 let us consider the position of the sun during midday by drawing again. Just position it during the midday in the northern hemisphere followed by the shadow of the same person during the midday.

Learners: Started drawing again as presenter went round.

Presenter: Lastly we draw the position of the sun during sunset on the northern hemisphere and the shadow of the viewer in the same position.

Learner s: Drew the last activity.

Presenter: Make a small line from the position of the viewer to show different times of the day. I will request one to give us from the same drawing what you have done and do it on the board and from there we are going to see as to whether we positioned in a correct way so that we correct each other. (One learner volunteered to draw on the board). Clap. Erased to make the drawing clearer and explained the drawing as shown on the board. Do we all agree with the drawing of our learner or is your drawing tarrying?

Learners: Almost tarrying.

Presenter: Seemingly the drawing is correct when we look at our figure we are still going to check whether it is correct from the other activity by answering the following questionnaire that will determine whether our drawing was right or wrong. The question goes as follows;

1. What causes the relative movement of the sun?

Learner 1: Our teacher told us that it is the sun that produces energy therefore it is the energy that causes movement.

Presenter: The question is where that energy comes from if the energy causes the sun to move. Still on the same learner.

Learner 1: The sun itself produces energy and so the energy it produces enables the sun to move.

Presenter: Well, that is his response, anybody else.

Learner 2: I agree that the same the sun energy it produces it is the same that makes it move.

Presenter: Anybody else.

Learner 3: I was told in church that God created the sun so he must be making it to move.

Learner 4: The sun does not move, it is the earth that is moving around the sun.

Presenter: Seemingly it is like we have different understanding in terms of the sun and the earth as to which is moving, I think by the end of the lesson we must all be having the same understanding. Here there is an object, the white part of it represents the earth, and the blue part is the axis and the 2 objects that are fitted. The 1st one (shows) is the person positioned in the northern hemisphere. I want you to tell me the direction does the earth rotate and the questions that were raised some of them are going to be answered after making the demonstration. (Called 2 learners forward to demonstrate as to in which direction the sun move). One object (Torch) represents the sun and the other represent the earth, the main issue is to check which direction the earth moves or the sun. As they are demonstrating, what I want you to understand, the correct answer whether is the sun or the earth that is moving, the correct is the earth that is moving. We will demonstrate so that some of you can be answered as to what is moving.

Learners: Demonstrated the movement of the earth around the sun.

Presenter: When on the northern hemisphere, the earth is moving or rotating anticlockwise. During the morning when the earth rotates, unfortunately we are far away. What you do is group yourselves and demonstrate it.

Learners: Grouped up themselves as the presenter went round showing them.

Presenter: From what we have done, if there are any questions concerning the rotation of the earth, here what we are dealing with take note, I want us not to mix, and we were doing the rotation and not the revolution but for now it was rotation. From the lesson, I will open this moment for any questions or clarity seeking questions before the end of the lesson. If no questions, it means everyone was fine then just answer for me NO. 2 and 3 and I will take the papers.

Learners: Answered the remaining questions as presenter went round

Reference Document 1-3: Transcription of Lesson 2

Teacher: Welcomed the learners to natural science lesson. As you are in groups am going to give you a worksheet. On it are the instructions for you to follow. (Distributed the worksheets to learners).

Learners: Started doing the work on the worksheets as the Teacher went round checking and assisting learners.

Teacher: Immediately after drawing and display your chart on the board. Finish up quickly present your charts on the wall. (The groups placed their charts on the board from the 3 groups).

- You have the sun in the morning, it rises in the morning for all groups.
- The midday is also indicated for all groups.
- There is the sunset for all the groups.

This means all the groups have put it the correct way. This being the position of the sun (As shown on the diagrams from the groups), and we look at the shadow of the person who is viewing the sun in the northern hemisphere in the morning. I expected the groups to make arrows to show that the sun and shadow go to the viewer. (Discussed the drawings of the sun on the charts with the learners). As far as you have done it you are going to compare my chart with your chart. From the charts you have drawn they are almost similar which is well done. Clap. Next you are going to do the same on the chart on the southern hemisphere as in the northern hemisphere in group discussion. (Distributed the charts to the groups).

Learners: Started the activity as the Teacher went round checking the work.

Teacher: Immediately after finishing you display your chart. This are charts about the southern hemisphere. We now look at the group works;

Group 3.

- The sunrise is in the morning
- The midday sun

-The sunset.

The shadows of the person are indicated as shown in all the group charts and are all correct. Also what I want you to note is the shade of the person but don't mind about the length. In as far as you have done it we are going to compare my chart with yours about this southern hemisphere. (Teacher displayed his chart). It also looks similar like the ones you have drawn. Now we look at the direction of the shadow in the southern hemisphere as compared to the northern hemisphere. In the southern hemisphere, the direction of the shadow goes anticlockwise as shown (shows on the chart) here when you are viewing the sun on the southern hemisphere but when you are viewing the sun on the northern hemisphere, the direction of the shadow is clockwise. You have done well. We now proceed to our next activity, now in groups am going to give you the models that you are going to demonstrate to one another in the group in as far as the position of the sun and the earth are concerned. You demonstrate what you have done in the chart. (Distributed the models to the groups to demonstrate according to what they did in the charts).

Learners: Started the activity.

Teacher: We are going to switch of the light and the torch will represent the sun and the model is the sun. You are going to demonstrate to each other according to what you have drawn in your charts. Switch on the torch and discuss among yourselves.

Learners: Continued the activity by switching of the light and lighting the torch to view the movement of the earth around the sun as the teacher went round explaining.

Teacher: Hope everyone has done the activity using the model. Next we all look at the board, the charts here also represent the model and torch that you have for the activity. The torch symbolizes the sun and also the model which represents the earth. We have the north and southern hemisphere as the sun during the day or in the morning or as the sun rises in the northern hemisphere, the direction of the sun shows that the earth is moving in an anticlockwise direction it means it

starts in the east to the west. When you are viewing the sun on the southern hemisphere, the direction shows as to how the sun and the earth move in a clockwise direction. The point to take note is that, some of us know that the sun is moving and not the earth;

-It is not the sun that is moving it is the earth. (Placed a chart on the board). Here we are looking at Rotation the sun does move.

- The earth rotates on its own axis to create day and night because of rotation of the earth.

-It takes 24 hours to complete its rotation that is why we have day and night here in Japan it is day time but in South Africa is in the night.

-The northern hemisphere the direction of rotation is anticlockwise and the shadow is clockwise.

-The southern hemisphere, the rotation is clockwise but the direction of shadow is anticlockwise.

-the earth does not only rotate but also revolve around the sun for 365 days making a period of a year and then goes back to its original position.

Learner 1 Question: What is an axis?

Teacher: Class response.

Learner Response: This is a point around which the earth rotates.

Learner 2 Question: What is the difference between rotation and revolving?

Teacher: A good question, class response.

Learner 1: Rotation is a circular movement around a single point while revolution is a circular movement around different points.

Teacher: Rotation is when the earth is spinning around its axis for 24 hours while revolution is doing rotation but also revolving around the sun for 365 days. After every 24hr rotation it changes the position because it is also moving around the sun or revolving. If there is no other question, thank you very much for the opportunity to deliver this lesson to you. (Clap).

Module 2 Open lesson and Post Lesson Conference

– first steps –

2-0 Objects of this Module, and points for attention

The object of this module is to give teachers with no experience of lesson study an understanding of its significance and the ways to apply it, by having them actually experience a lesson observation and the subsequent post lesson conference. Being implemented after Module 1, this module should go smoothly since each participant will understand his or her own role. In the post lesson conference the participants will engage in discussions after observing a lesson by a fellow teacher, and it is important for them to have meaningful discussions in a good atmosphere so that they will all want to go on to the next lesson study.

2-1 Deciding on an open lesson volunteer – leader teacher as first trailblazer – adjusting schedule – agreement of managerial staff

Throwing one's own lesson open will be a psychological hurdle initially. As a leader teacher, you should be the first to give an open lesson for the other teachers. Adjust your schedule so that as many teachers as possible can attend. For instance, if you can get the students of the class you are in charge of to stay behind for an hour after school, the other teachers will be able to attend as their own lessons will be over. You should obtain beforehand the understanding of the school's managerial staff – the principal, vice principal and heads of subjects – concerning the objects and significance of the lesson study and consult with them as you determine the schedule. If possible, also have the managerial staff attend.

2-2 Preparations by volunteer ahead of the day – drafting of lesson plan and preparation of copies

The open-lesson giver should prepare a lesson plan and make as many copies of it as there will be persons observing. She or he should also prepare the same quantity of the worksheets to be used in the lesson, and of lesson observation sheets. Another leader teacher should be requested to act as facilitator for the lesson review session. Such teacher will presumably have attended Module 1 and be familiar with the flow, but nevertheless should once more be given an explanation about managing a post lesson

conference. Also prepare the flipchart, writing instruments and so forth that will be needed for the post lesson conference.

2-3 Giving the open lesson – points for attention concerning observation

The lesson-presenter should conduct the lesson according to the lesson plan. The students are likely to be nervous, so tell them to “just go through the lesson in the usual way”. The observers should record the lesson in accordance with the format of the lesson observation sheet. They should make successive entries in the sheet in real time, on the basis of the points shared in Module 1. Observing the students’ behavior is especially important. The observers should pay attention to whether the students understand the lesson, and what kind of things they trip up on or make mistakes about.



2-4 Post lesson conference; procedure and points to bear in mind – facilitator’s role – note-taking method

After the lesson, a post lesson conference should be held under a facilitator’s guidance. The facilitator should have the discussion proceed in such a way that everyone has a turn to speak, amid a relaxed atmosphere. She or he should also summarize on the blackboard or flipchart the points that the participants make when they speak. It will be advisable to confirm the speakers’ intentions while doing this. Appoint a participant as recorder, and have her/him record the content of the participants’ utterances. Accumulating such records will be important for raising the abilities of the group as a whole. After the post lesson conference, put the lesson plan, the worksheets used in the lesson, and the participant register together into a file. post lesson conference should begin with comments by the lesson-presenter, who should look back concisely over the aims of the lesson, what was good about it as regards its actual development, etc., and the issues with it, while referring to the lesson plan. Next, the observers will make their comments. They

should first deal with the good aspects of the lesson. It is advisable to let each one make comments in turn. When they have covered all the good points, they should comment on the points needing improvement. After that, have them put specific improvement proposals forward.



2-5 Improving the lesson plan

The lesson-giver should revise the lesson plan on the basis of the improvement proposals put forward by her/his colleagues. It will not be necessary to incorporate all the improvement proposals, however – just as many as is feasible. It will be a good idea to present the improved lesson plan at the next lesson study.

2-6 Deciding on the next open-lesson volunteer

The final task of the post lesson conference is to decide on the volunteer and schedule for the next open lesson. Open lessons will preferably be conducted with a frequency such that every year each participant is able to give at least one open lesson and receive views on improving it at a post lesson conference.

Reference Document 2-1 Sample Lesson Plan by South African Teacher

Your region or country will have rules concerning the format for lesson plans. The plans should be drawn up according to those rules. An example of a lesson plan format is shown below.

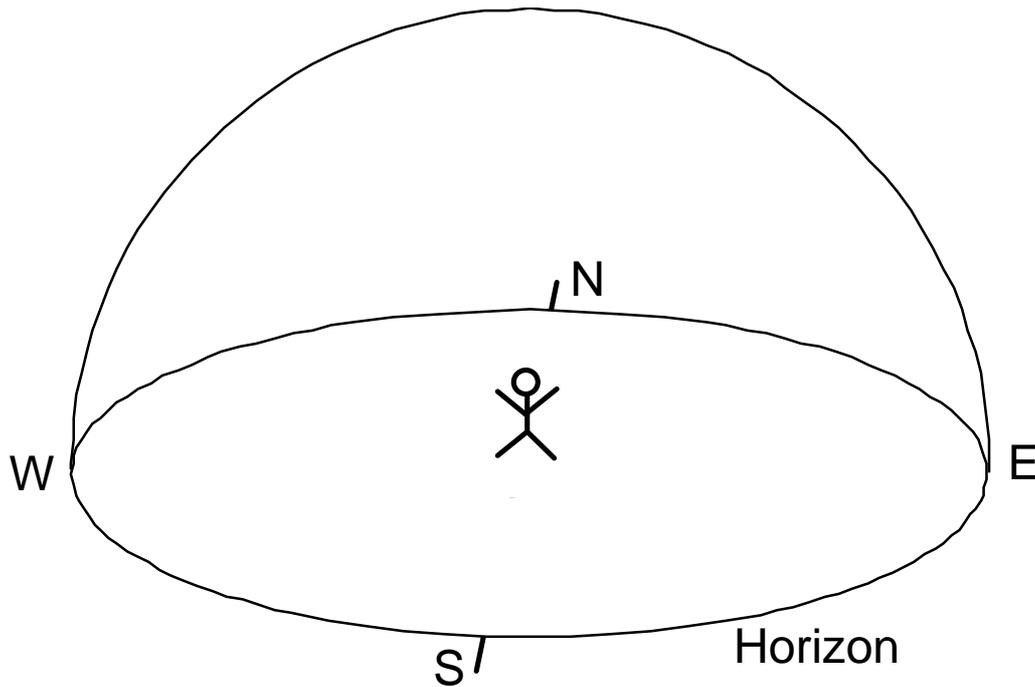
Subject: Science	Grade: 9
Unit: Earth and Space	Date of lesson: 2006/12/1
Last period's learning: Sun's movements and shadows' movements	Next period's learning: Earth's orbit
<p>Objects of this period:</p> <ol style="list-style-type: none"> 1. Using a model, reproduce earth's rotation on the basis of the relative movements of the sun and shadows. 2. Use the model to reproduce the relative differences in the sun's movements in the northern and southern hemispheres. 	
<p>Teacher's activities:</p> <p>Seat the students divided into groups.</p> <p>Hand Worksheet 1 out, and have them write in it a description of the movements of the sun and shadows in the northern hemisphere. Give support.</p> <p>Instruct the groups to post their results on the blackboard.</p> <p>Summarize the groups' results while comparing such with pictures prepared beforehand.</p> <p>Hand Worksheet 2 out, and have them predict the movements of the sun and shadows in the southern hemisphere and write a description of such in the worksheet. Give support.</p> <p>Summarize the groups' results while comparing such with pictures prepared beforehand.</p>	<p>Students' activities:</p> <p>Divide into and sit in groups.</p> <p>Work individually on the worksheet.</p> <p>Compile group's results, record such on simili paper, and post paper on blackboard.</p> <p>Work individually on the worksheet.</p> <p>Compile group's results, record such on simili paper, and post paper on blackboard.</p>

<p>Hand model globes and flashlights out, and have the students reproduce the movements of shadows in the northern and southern hemispheres, confirming their predictions as they do so.</p> <p>Give support.</p> <p>Explain the direction of earth's rotation, using a drawing prepared beforehand.</p> <p>Put the question: Which hemisphere's shadows' movements do the hands of a clock match?</p>	<p>Reproduce the movements of shadows in the northern and southern hemispheres, confirming their predictions as they do so.</p> <p>Find the direction of earth's rotation.</p> <p>Produce the answer.</p>
<p>Assessment perspectives:</p> <p>Questions</p> <p>Worksheet entries</p> <p>Performance of experiments</p>	<p>Teaching aids:</p> <p>Styrene foam globes, bamboo wands, flashlights, toothpicks</p>

Reference Document 2-2 Sample Worksheet by
South African Teacher

Worksheet 1

Name: _____



1. In the drawing above, draw in what you think the movements of the sun and a person's shadow in the northern hemisphere are. Draw and label the sun's and shadow's positions from sunrise to sunset, including midday.
2. Discuss your ideas about this with the others in your group.
3. Write a summary of your group's discussion results in the simili paper that was handed out, and post the paper on the blackboard.

Reference Document 2-3 Sample Minutes from Post Lesson Conference on South African Teacher's Lesson

1. Teacher's review

The lesson went as planned.

2. Comments from observers

(1) Good points of the lesson

- Teacher showed confidence in conducting the lesson.
- Toured around desks at appropriate junctures, giving support to students.
- Lesson was student-centered and based on the activities.
- Students engaged well in the activities.
- The content was linked to everyday life.
- Simili paper and teaching aids were well prepared.

(2) Improvement suggestions for the lesson

- In the introduction, it should be made clear what the students are to do in the worksheets.
- Instead of the teacher giving a summary, the students should describe their own predictions.
- Where the students' predictions vary, the teacher should ask them for their views.
- Before giving the answer concerning the direction of the earth's rotation, the teacher should ask the students for their own ideas based on the experiments.

Module 3 Lesson Study by Team in Response to the Challenges

3-0 Objects of this Module, and points for attention

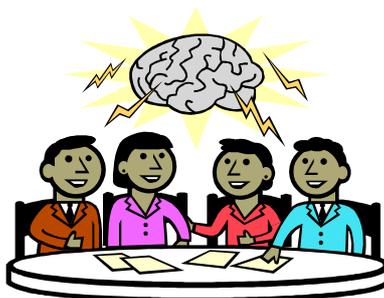
Module 2 introduced the first step of lesson study, in which teachers actually give open lessons and improvements to the lessons are progressively made via the discussions at post lesson conference. The present module will advance further and introduce action research at schools, whereby lessons are planned that will resolve various issues in the classroom, thus yielding further-improved lessons. For the purposes of implementation, action research is divided into several steps: (1) recognition of challenges, (2) planning of lessons that address the challenges, (3) implementation of simulation lessons and post lesson conference, (4) improvement of lesson planning, and (5) implementation of research lessons and post lesson conference. Several days will be required for these.

3-1 Selecting topics

Bearing in mind the lesson planning for the year, select the topics to be researched from the content of lessons to be given one or two months later. As far as possible, you should choose things that the students have difficulty understanding, things that it is hard to get the students interested in, and things that do not relate to the activities of today's students.

3-2 Recognizing challenges regarding the topics

Conduct brainstorming to recognize the issues concerning the topics selected. Have the participants share their experiences and speak freely on what kinds of aspects present difficulties. As the various views are expressed, the facilitator should write them on simili paper or on the blackboard. When there are no more views to be expressed, the participants should all consider together how to classify and compile the challenges obtained, and what their causes are.



3-3 Planning

As a group, frame lesson plans concerning the topics selected. First consider the relative positioning of the topics, using textbooks as reference. By finding out how the topics were dealt with in the last school year's textbooks, you will determine the levels of previous knowledge that the students possess. Find out in what sort of order the items related to the topics appear in the textbooks, and use that information to draw up a concept map. Also find out the relevance of the topics to everyday life, and indicate such in the concept map. If possible also use textbooks from earlier school years and other reference literature to find out in what manner the topics develop over time.

Next, draw up a plan for the unit. Consider in what order to deal with the items making up the topics, and what to deal with in the individual lessons. On the basis of the unit plan, decide in which lessons the research is to be put into practice.

Make clear the concepts that the students will learn in those lessons, and think about activities that will help to form such concepts. Consider what kinds of teaching aids to use, and in what ways, in order to have the students engage in activities that will support them in forming the concepts spontaneously. Consult the textbooks and other documents regarding the teaching aids, and if any materials will be hard to obtain, use your ingenuity to utilize near-at-hand things as substitutes. Also consider from what viewpoints (for example the students' utterances, what they write, their behavior) to evaluate the degree to which a concept has taken hold.

Next, look at the introductory part of the lessons, where the concept-forming activities are introduced. Think about ways of determining the students' previous knowledge and how to capture their interest.

Finally, consider how to conduct the closing part of the lessons so as to summarize the concept that has newly taken hold, and link it to the next lesson, which will deal with the next concept.

When the plan has taken shape, think about what things to write on the blackboard, and what kinds of worksheets to prepare.

3-4 Challenge for math teachers: Predicting where students will trip up

Math lessons include various problem-solving activities for having concepts take hold. Think about what kinds of things students are likely to trip up on when they are given problem-solving exercises. To consider this it will be useful to analyze their solution processes in worksheets and test problems used in past lessons.

3-5 Challenge for science teachers: Do exploratory experiments

Experiment and observation are the main concept-forming means in science lessons. But before having students engage in such activities, the teacher should always do the experiment her/himself to see how it works out. Conducting such exploratory experiments will bring out the things to which attention needs to be paid in order to carry the experiment out safely. It will also enable the teacher to anticipate how the lesson will develop and to determine what kind of support will need to be given. Also, if there is some flaw in the experiment, so that the results come out different from what was expected, the teacher will be able to alter the experimental conditions or exercise initiative in some other way so that more appropriate results will be obtained. Further, she/he will be able to find out beforehand the places where the students are likely to trip up, and prepare appropriate support for such.



3-6 Holding a simulation lesson

When the lesson plan is complete, hold a simulation lesson with teachers in the role of students. In the simulation lesson, the teacher should approach the mock students as if in a real lesson, and the mock students should imitate the knowledge levels and modes of thinking possessed by students of the grade in question, as if they really were such students. If time allows, the simulation lesson should last the same length of time as an actual lesson. This will enable the participants to get a more realistic idea of how the lesson would be if actually carried out. After the simulation lesson, conduct post lesson conference according to the procedure in Module 2, and use the views expressed to produce an improved version of the lesson plan. Put the views expressed into a file together with the lesson plan and worksheets.

3-7 Implementing a research lesson

The demonstration lesson should not be attended only by the group members who planned the lesson – also invite the school’s managerial staff, teachers of other subjects, teachers’ consultants and so on, if possible. Prepare copies of the lesson plan, lesson observation sheet, and worksheets to be used in the class, in quantities sufficient for the number of observers. State in the lesson plan what kinds of innovations have been included to tackle the issues identified in 3-2. Instruct the students to go through the lesson just as they normally do. As the observers observe and take notes, they should pay attention to the behavior of each individual student.



3-8 Post lesson conference

After the demonstration lesson, conduct a post lesson conference according to the procedure in Module 2. The facilitator will preferably be a non group member who understands the lesson study procedure. The facilitator should start by having the lesson-giver speak on the intent of the lesson, the degree to which the lesson plan was achieved, student reactions that differed from what was anticipated, and points for introspection, then go on to have the observers discuss successively the good points, points for improvement, and proposals for improvements. She or he should also summarize on the blackboard or flipchart the points that the participants make when they speak. A recorder should summarize the content of the speeches and file such together with the lesson plan, worksheets and participant register.

3-9 Improving the lesson plan

The lesson plan should be revised on the basis of the improvement proposals put forward at the post lesson conference. The revised lesson plan should be bound into a file and kept as an asset.

Reference Document 3-1 Sample Discussions of Teachers’ and Students’ Challenges by South African Teacher

Sample 1 Summary of discussion of challenges in junior high school science (earth science field)

Discussion was held on the earth science field of junior high school science. As a result, the following challenges were recognized.

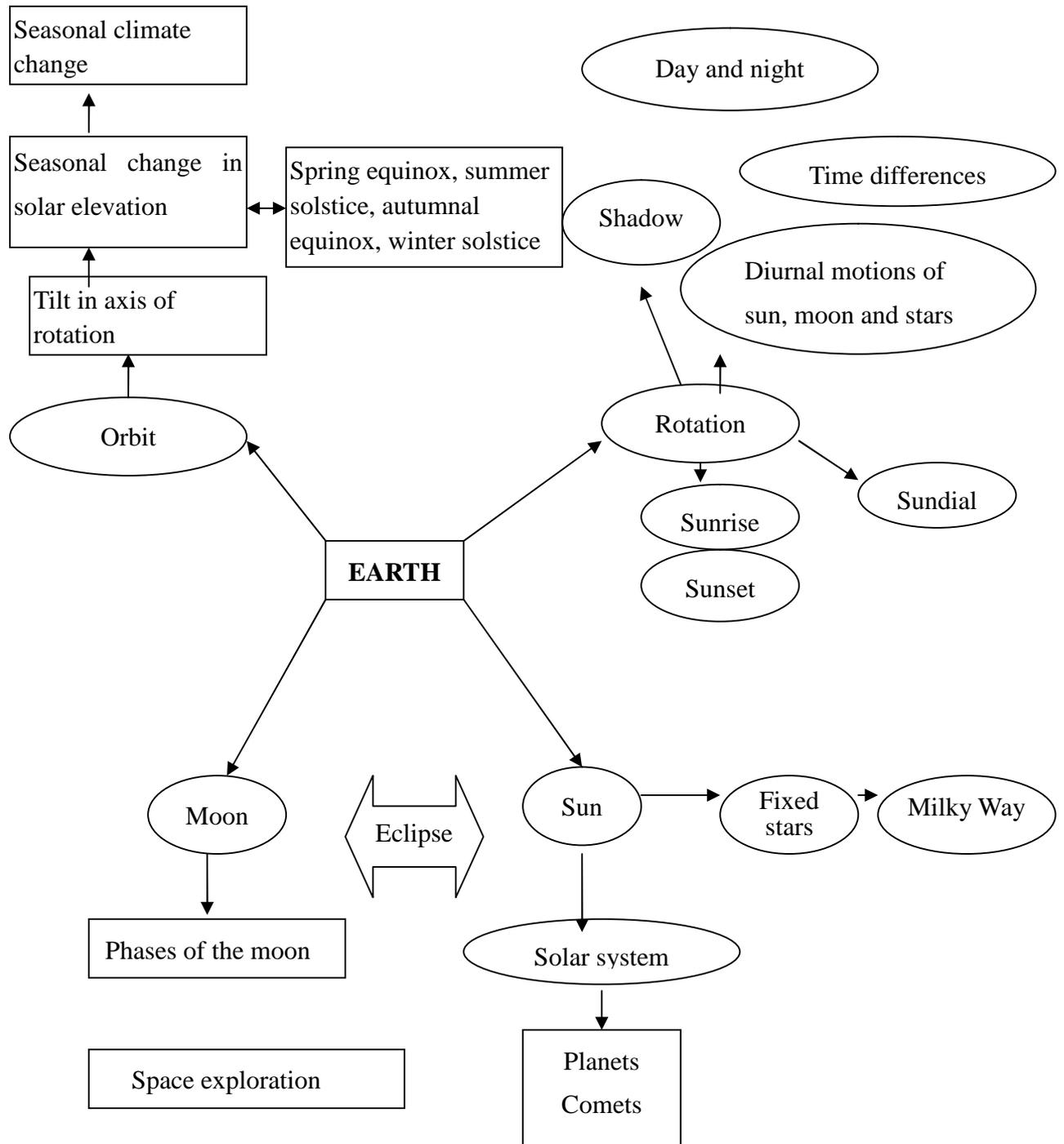
- The teachers’ fundamental knowledge concerning the field of geoscience is inadequate. Many science teachers have not undergone specialized study regarding earth science and astronomy.
- Methods for teaching geoscience by relating it to everyday life are poorly understood.
- Learning activities that have “scientific inquiry” as their object should be planned.
- There is no firsthand experience of the natural phenomena such as volcanic eruptions and earthquakes.
- Student-centered lessons concerning geoscience topics should be planned.

Sample 2 Summary of discussion of challenges in junior high school science (chemistry field)

Discussion was held on the chemistry field of junior high school science. As a result, the following issues were recognized.

- In many schools, experimental equipment is lacking and chemistry is taught on a largely theoretical basis.
- The teachers are not good at improvising teaching aids from readily obtainable everyday materials.
- Even where the schools have experimental equipment, some of the teachers have not the self-confidence to conduct experiments.
- Many teachers have had almost no experience of laboratories during the course of their own learning and teaching.
- Teachers have inadequate specialized knowledge concerning the field of chemistry. Some teachers have done no specialized study of chemistry.
- Lessons that relate chemistry to experiences in everyday life should be planned.

Reference Document 3-2 Sample Concept Map of Subject
 Content Drawn
 by South African Teacher



Reference Document 3-3 Sample Unit Plan Prepared by South African Teacher

Activities concerning space and the earth (10 class hours)

- (1) Definition of planets, asteroids and other members of the solar system
- (2) Types of planet
- (3) Model of the solar system
- (4) The sun and its structure
- (5) The sun's roles with regard to the earth
- (6) Folk tales about the sun
- (7) Explanation of the earth's rotation and the movement of shadows, using model
- (8) Explanation of time differences, using model
- (9) Explanation of earth's orbit and the causes of the four seasons, using model
- (10) Phases of the moon
- (11) Differences in moon's appearance in northern and southern hemispheres
- (12) Folk tales about the moon
- (13) Structure of telescopes
- (14) Structure of rockets
- (15) Role of science in understanding space