The Republic of Ghana
Japan International Cooperation Agency

Ghana
Project to Support the Operationalization of the In-Service Training Policy

Sourcebook

December 2006

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PREFACE

The Ghana Education Service (GES) has developed a framework for the In-Service Training (INSET) policy for basic education. The aim is to establish an institutionalised structure for basic school teachers' continuous professional development. Since December 2005, the GES has been developing an INSET programme which focuses on the teaching of basic school Mathematics and Science. In the process, the programme has developed support materials for institutionalization of INSET in the education system.

At the inception of the INSET Programme, a baseline study was conducted which revealed that although INSET activities at the district and the school levels have increased in the last few years, it does not reflect a change in teachers' and head teachers' work output, especially in instructional practices at the classroom level.

INSET in Ghana is often conducted like a pre-service training programme. Both novice and experienced teachers are trained more or less like teacher trainees or students, with predetermined training contents, regardless of their own training needs. The study suggested that this situation could be attributed to the method of INSET delivery.

This sourcebook has been developed to assist key stakeholders of the INSET at the district and school levels. The aim is that the Sourcebook will serve as reference material for various personnel involved in In-Service Training. It is recommended for:

- District level personnel involved in INSET at the district level;
- School level personnel who provide INSET at the school level;
- Use in General pedagogy;
- Use in Mathematics and Science teaching

Resources for teaching other subjects of the curriculum could be developed to help teachers upgrade their skills, using the institutionalised structure of INSET recommended in this Sourcebook.

It is our expectation that this Sourcebook will help address some of the challenges in the operationalisation of institutionalised INSET at the district and school levels.

Michael Kenneth Nsowah
AG. Director General (GES)

Margaret Benneh
Director, Teacher Education Division (GES)

Acknowledgement

The Ghana Education Service would like to express its appreciation to those who contributed written material and ideas that are included in this handbook and edited it. The GES would also like to acknowledge the contribution of personnel in DEO of INSET Project's pilot districts, namely Tamale Metro, Kassena-Nankana, Wa Municipal, Tano South, Akuapem North, Akatsi, Dangme West, Adansi North, Assin North and Mpohor Wassa East, who gave many feedback to improve draft version of this document. The GES would also like to thank JICA and the INSET Project for supporting this effort and underwriting the costs of the preparation and printing of this document.

The followings are the list of representative persons who contributed to this document.

Dr. C.B. Duedu	University of Cape Coast
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Users' Guide

Users:

Users of the Sourcebook.

Objective of this Module

The Users' guide is to assist Sourcebook users to select the right modules and utilise the modules effectively for particular INSET activities.

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Abbreviation

This abbreviation is for all the module of the Sourcebook.

AAP:	Annual Action Plan
ACS:	Activity Completion Sheet
AD:	Assistant Director
ADEAP:	Annual District Education Action Plan
ADPR:	Annual District Performance Report
APR:	Annual Progress Report
CBI:	Cluster-based INSET
CL:	Curriculum Leaders
CP:	Course Prefect
CPD:	Continuous Professional Development
CS:	Circuit Supervisors
DA:	District Administrations
DDE:	District Director of Education
DEO:	District Education Office
DIU:	District INSET Unit
DTST:	District Teacher Support Team
EMIS:	Education Management Information System
FQS:	Feedback Questionnaire Sheet
GER:	Gross Enrolment Ratio
GES:	Ghana Education Service
GOG:	Government of Ghana
HT:	Head Teacher
INSET:	In-Service Training
IPPD:	Integrated Personnel Payroll and Database
JICA:	Japan International Cooperation Agency
JSS:	Junior Secondary School
CLPS:	Curriculum Leaders Performance Standards
M&E:	Monitoring and Evaluation
MGC:	Multi-grade Class
MGT:	Multi-grade Teaching
MOE:	Ministry of Education
MTEF:	Medium Term Expenditure Framework
NGO:	Non-Governmental Organization
NIU:	National INSET Unit
P.E.:	Physical Education
PP:	Planning Paper
PS:	Performance Standards
PTA:	Parent and Teacher Association
R.P.K.:	Relevant Previous Knowledge
RDE:	Regional Director of Education

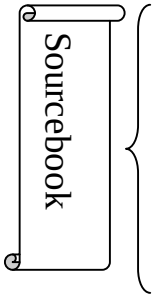
ROOT:	Record of Orientation / Training for HT and CL
SBI:	School-based INSET
SMART:	Specific, Measurable, Achievable, Relevant and time-bound
SMC:	School Management Committee
SPIP:	School Performance Improvement Plans
SSS:	Senior Secondary School
STM Project:	Project of Improvement of Educational Achievement in Science, Technology and Mathematics in Basic Education
TED:	Teacher Education Division
TLM:	Teaching and Learning Materials
TTC:	Teacher Training College
WSD:	Whole School Development

1. Introduction

The Sourcebook is used as a source of guide in various activities of the INSET programme. It is expected that a wide range of personnel involved in the INSET programme utilise the Sourcebook.

1.1. Modules in the Sourcebook

The Sourcebook comprises 6 modules and each module has different purposes and target users. Figure 1 shows the title of each module.



Modules	Titles
Module 1	District Guidelines
Module 2	Operational Manual for District Level INSET
Module 3	School-based and Cluster-based INSET Manual
Module 4	General Pedagogy
Module 5	Sample Lesson Plans in Mathematics
Module 6	Sample Lesson Plans in Science

Figure 1: Title of Each Module

It should be noted that a user is provided with the only modules that he/she needs. A user does not receive modules irrelevant to the INSET activities that he/she is involved in. This is to minimise the cost of provision of Sourcebook and also to make Sourcebook user-friendly.

1.2. Purposes of Each Module

This section briefly explains the purposes of the modules. For further explanations about the purposes, read "The Objectives of this Module" written in the cover page of each module.

Module 1 (District Guidelines) is a set of guidelines for the INSET activities at the district level (as well as the school level). It describes the overview of the INSET programme, roles and responsibilities of the stakeholders and activities of INSET programme at the district and the school level. It is expected that, in various activities at various levels, this module will be used as a source of basic information about the INSET programme. It should be noted that the National level INSET activities are dealt with in the National Guidelines, which is not included in the Sourcebook.

Module 2 (Operational Manual for District Level INSET) is a manual that describes the general operation of the INSET activities at the district level. It elaborates how the INSET activities can be planned, implemented and evaluated efficiently. The **Appendix 1** provides procedures and content of specific INSET activities. These are:

HT Orientation, CL Orientation, CL Sourcebook Training, Information Exchange Seminar, Annual Implementation Workshop, Examples of Workshops/Meetings and Field Monitoring for SBI/CBI.

Module 3 (School-based and Cluster-based INSET) is a manual that explains how School-based and Cluster-based INSET (SBI/CBI) are planned, implemented and monitored. The module focuses on a concept that teachers improve themselves from sharing lesson preparation, implementation and discussion.

Module 4 (General Pedagogy) is a reference book that provides the users with helpful information for better teaching and learning. The module describes how teachers can develop lesson plans and practice adequate lesson preparation as well as how teachers can conduct lessons effectively. It also depicts subject-specific teaching skills that users can refer to when needed. The module uses several examples of the skills and methods for the sake of explanation; however, those who need more practical examples are advised to also refer to Modules 5 and 6, which elaborate how to use some of those skills and methods in actual lessons. It is recommended that the users refer to some sections of Module 4 when they are involved in SBI/CBI and CL Sourcebook Training.

Modules 5 and 6 (Sample Lesson Plans in Mathematics and Science) comprise sample lesson plans of challenging topics. While Module 5 deals with challenging topics in Mathematics, Module 6 deals with challenging topics in Science. The sample lesson plans are in accordance with the MOE Teaching Syllabus for Mathematics (Primary School) and Integrated Science (Primary 4-6). Each module has 2 types of sample lesson plans, Type A and Type B. Sample lesson plans of Type A have additional information and teaching hints to those of Type B. With the extra information, the sample lesson plans of Type A should be very helpful when preparing and implementing demonstration lessons. The sample lesson plans of Type B, with less volume, may be realistic samples for teachers to refer to when they develop their lesson plans.

2. Guide for Selecting Modules

Users need to select modules depending on the INSET activity that they are involved in. This section helps each user to determine which modules are needed for a particular INSET activity.

2.1. The Users of the Sourcebook

Table 1 shows the major users of the Sourcebook.

Table 1: Users of the Sourcebook

Level	User
District	– District INSET Unit (DIU) – District Teacher Support Team (DTST)
School	– Head Teachers (HT) – Curriculum Leaders (CL) – Teachers

The following describes modules needed for a particular INSET activity with regard to users.

2.2. District INSET Unit (DIU)

Table 2 shows the modules that the DIU needs to use depending on INSET activities.

Table 2: Selecting Modules for DIU

User	Modules	INSET activities involved in
DIU	Module 2	General administrative matter of District Level INSET
	Appendix 1 of module 2 **(Activity 4)**	Information Exchange Seminar
	Appendix 1 of module 2 **(Activity 5)**	Annual Implementation Workshop
	Appendix 1 of module 2 **(Activity 6)**	Examples of Workshops/Meeting

DIU uses Module 2 for various administrative matters relating to INSET provision at the district level. DIU should utilise the module when planning, implementing and evaluating the INSET activities. Specifically, DIU needs to use designated sections of Module 2 for the particular INSET activities shown below.

Information Exchange Seminar: When preparing Information Exchange Seminar, DIU is supposed to use the Appendix 1 of Module 2 **(Activity 4)**, which describes the specific content

of Information Exchange Seminar.

Annual Implementation Workshop: When preparing Annual Implementation Workshop, DIU should use the Appendix 1 of Module 2 **(Activity 5)**, which explains the specific content of Annual Implementation Workshop.

Examples of Workshops/Meetings: When preparing some other necessary workshops, DIU can refer to the Appendix 1 of Module 2 **(Activity 6)**, which presents several examples of workshops and meetings that DIU might want to organise.

2.3. District Teacher Support Team (DTST)

Table 3 shows the modules that the DTST needs to use depending on INSET activities.

Table 3: Selecting Modules for DTST

User	Module	INSET activities involved in
DTST	Module 2	General information relating to the facilitation of District Level INSET
	Appendix 1 of Module 2 **(Activity 1)**	HT Orientation
	Appendix 1 of Module 2 **(Activity 2)**	CL Orientation
	Appendix 1 of Module 2 **(Activity 3)**, Modules 3, 4, 5 and 6	CL Sourcebook Training (1st and 2nd)
	Appendix 1 of Module 2 **(Activity 7)**	Field Monitoring for SBI/CBI

DTST should use Module 2 for facilitating various INSET activities that they are responsible for. Specifically, DTST needs to use designated sections of Module 2 and other modules for the particular INSET activities shown below.

HT Orientation: When preparing HT Orientation, DTST is supposed to use the Appendix 1 of Module 2 **(Activity 1),** which elaborates the specific content of HT Orientation.

CL Orientation: When planning CL Orientation, DTST should use the Appendix 1 of Module 2 **(Activity 2)**, which explains the specific content of CL Orientation.

CL Sourcebook Training: DTST should use the Appendix 1 of Module 2 **(Activity 3)** for CL Sourcebook Training. For the training, DTST also needs to comprehend Module 3, SBI/CBI Manual, since the CL Sourcebook Training is to describe SBI/CBI. In addition, DTST should refer to Module 4, 5 and 6 for SBI/CBI demonstration activities (lessons), which is the major content that the training is to deal with.

Field Monitoring for SBI/CBI: When going Field Monitoring for SBI/CBI, DTST should use the Appendix 1 of Module 2 **(Activity 7)**, which explains the procedure of the monitoring.

2.4. Head Teacher (HT)

Table 4 shows the module that the HT needs to use for the INSET activity.

Table 4: Selecting Modules for HT

User	Module	INSET activities involved in
HT	Module 3	School-based/Cluster-based INSET **(Administration)**

HT should use Module 3 for administrative matters concerning SBI/CBI.

2.5. Curriculum Leaders (CL)

Table 5 shows the modules that the CL needs to use, depending on the roles that he/she plays at the INSET activity.

Table 5: Selecting Modules for CL

User	Module	INSET activities involved in
CL	Module 3	School-based/Cluster-based INSET **(Facilitation)**
	Modules 4, 5 and 6	School-based/Cluster-based INSET **(Demonstration Activity)**

CL should use Module 3 for facilitating SBI/CBI. CL can also seek relevant information about general teaching and learning methods in Module 4 when preparing SBI/CBI activities. In addition, sample lesson plans in Modules 5 and 6 can be used or modified for SBI/CBI demonstration lessons.

2.6. Teachers

Table 6 shows the modules that the teachers need to use at the INSET activity.

Table 6: Selecting Modules for Teachers

User	Related Module	INSET activities involved in
Teacher	Modules 4, 5 and 6	School-based/Cluster-based INSET **(Demonstration Activity)**

Teachers can also seek relevant information about general teaching and learning methods in Module 4 when preparing SBI/CBI activities. In addition, sample lesson plans in Modules 5 and 6 can be used or modified for SBI/CBI demonstration lessons.

3. Guide to the Effective Use of the Modules

3.1. Module 1 (District Guidelines)

Since Module 1 has not been designed as a training manual for a particular INSET activity, it will not be used as the main module for any INSET activity. However, reference should be made to it for extra information and clarification whenever INSET implementers require basic information about the INSET programme.

3.2. For SBI/CBI

As shown in Tables 5 and 6, it is very important that CL and teachers make good use of Modules 4, 5 and 6. Wise use of the modules helps them to conduct beneficial SBI/CBI.

Use of Module 4 for SBI/CBI

Module 4 (general pedagogy) deals with several aspects of teaching and learning, each of which can be an objective of SBI/CBI. CL can refer to Module 4 when he/she designs an objective for SBI/CBI, i.e. a theme for SBI/CBI.

Because Module 4 also provides users with specific skills of teaching and learning, CL and teachers can refer to Module 4 when they try to develop lesson plans for challenging topics. It is expected that Module 4 will give an idea of how to tackle the challenging topic.

Use of Modules 5 and 6 for SBI/CBI demonstration activity (lesson)

Modules 5 and 6 comprise sample lesson plans for challenging topics. CL and teachers can simply use some of the sample lesson plans for their SBI/CBI. They might find that the sample lesson plans of Type A are more helpful and useful than those of Type B because the lesson plans of Type A give a detailed explanation of how to teach.

They are also expected to develop their own lesson plans for a challenging topic using one of the samples as a model. Once CL and teachers have become familiar with the sample lesson plans and their teaching and learning strategies, it is strongly recommended that CL and teachers start developing their own initiated lesson plans for challenging topics.

3.3. Module 4 and Practical Modules 5 and 6

If users of Module 4, 5 and 6 pay attention to the relationship among the modules, it will benefit the users a lot. The relationship is clarified below.

While Module 4 provides readers with general pedagogy, Modules 5 and 6 put these skills and methods into practice in actual lessons. For example, a part of Module 4 discusses questioning skills and explains their importance and general usage, Modules 5 and 6 elaborate on the specific uses of these questioning skills in a real lesson. Using sample lessons from the syllabi, Modules 5 and 6 present how general pedagogy in Module 4 can be put into action.

Using Modules 5 and 6 after Module 4

Users of Module 4 can find more **practical and specific** teaching and learning approaches in Modules 5 and 6. Users of Module 4 should acquire concrete ideas for teaching and learning after studying the sample lessons of Modules 5 and 6.

Using Module 4 after Modules 5 and 6

In contrast, when users of Modules 5 and 6 seek information about **general** teaching and learning approaches, they should refer to Module 4. Studying Module 4 should help them to obtain broad ideas of teaching and learning.

3.4. English as a Teaching Tool

A section of Module 4 theoretically highlights the use of English language as a teaching tool for other subjects. On the other hand, sections of the sample lesson plans in Modules 5 and 6 elaborate the practical use of English language in actual lessons. Using sample lessons from the syllabi, Modules 5 and 6 present how the use of English as a teaching tool written in Module 4 can be put into practice in actual lessons.

4. Guide to the Revision of the Sourcebook

The Sourcebook is to be revised. As the INSET programme continues, the educational situation in Ghana may change. In addition to that, there might be some particular needs depending on the situation of a district. In that case, the revision should take the needs into consideration. The revision of the Sourcebook should reflect those changes and needs.

4.1. Feedback for Revision

In the INSET programme, all users have opportunities to give feedback about the Sourcebook. In order to develop a better Sourcebook in a revision process, it is important that users of the Sourcebook actively give honest and constructive feedback. Feedback from people who actually use the Sourcebook will be highly appreciated. The Information Management System of the INSET programme will play the role of collecting the feedback. The NIU will utilise the feedback and make the necessary changes accordingly when revising the Sourcebook.

The revision can be done on module basis, rather than revising the whole Sourcebook. This should keep the cost and time of the revision to the minimum.

4.2. Modules to Revise

While all the modules of the Sourcebook can be revised, some modules need to be given a more serious attention.

Adding Lesson Plans developed by CL and teachers

Modules 5 and 6, presenting sample lesson plans for challenging topics, should be built up by adding more sample lesson plans. CL and teachers must be encouraged to develop these lesson plans. CL and teachers have opportunities to develop lesson plans for challenging topics when preparing their SBI/CBI. Besides, CL can improve lesson plans when discussing the challenging topics with other CLs in CL Sourcebook Training.

When developing lesson plans for challenging topics, CL and teachers are first recommended to refer to the sample lesson plans of **Type B** in Modules 5 and 6, making similar lesson plans of Type B. Those are relatively simple and easier to make than those of Type A.

Some of the lesson plans developed by CL and teachers should be added to the modules through revision of National INSET unit.

Modules for new subjects

Although the current Sourcebook deals with two subjects, Science and Mathematics, other subjects should be added, as the INSET programme progresses. For instance, a new module can be developed for sample lesson plans for English to form Module 7. The INSET programme anticipates that teachers will give feedback informing which subject modules are needed and should be added to the Sourcebook.

4.3. Content of the Sourcebook and the GES Handbooks

A baseline study of the INSET programme has revealed that actual delivery procedures of INSET activities are not in line with some of the contents of the GES handbooks (i.e. the Addendum to Headteachers' Handbook, etc). Accordingly, the current version of the Sourcebook has been developed taking those findings into consideration. As a result, the

Sourcebook differs from the content of the GES handbooks in some aspects. With regard to INSET, the Sourcebook contains latest information regarding teaching and teacher education. Thus, it is recommended that especially, personnel involved in INSET use the Sourcebook.

4.4. Updating the Sourcebook

As the Sourcebook is to be revised periodically, the content of the Sourcebook is subject to change. It means that users of the Sourcebook need to keep updating the Sourcebook. In the process of updating, only modules that have been revised will be made available to users.

It will be the responsibility of the DIU to distribute new versions of the modules. After receiving a revised version of the modules from the NIU, the DIU is requested to make copies of the modules and distribute them to the users. The number of copies should be decided depending on the actual need of the district. It is important that DIU takes the cost into consideration.

Module 1: District Guidelines

Users:

All personnel at the district level

Objectives of this Module

Module 1 (District Guidelines) is a set of guidelines for the INSET activities at the district level (as well as the school level). It describes the overview of the INSET programme, roles and responsibilities of the stakeholders and activities of INSET programme at the district and the school level. It is expected that, in various activities and levels, this module will be used as a source of basic information about the INSET programme.

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The INSET programme is supposed to be established on the INSET Policy of Basic Education. However, as the operation of the policy is still at the initial stage, the INSET programme aims at developing the prototype of what the INSET Policy seeks to institutionalise. The programme will involve a variety of stakeholders from the school, district and national levels, and those stakeholders are expected to make a large contribution to the implementation of the programme as well as the development of the policy.

National Guidelines and INSET Sourcebook have been developed to support the programme. The relation between the policy and the related documents is shown in Figure 1.

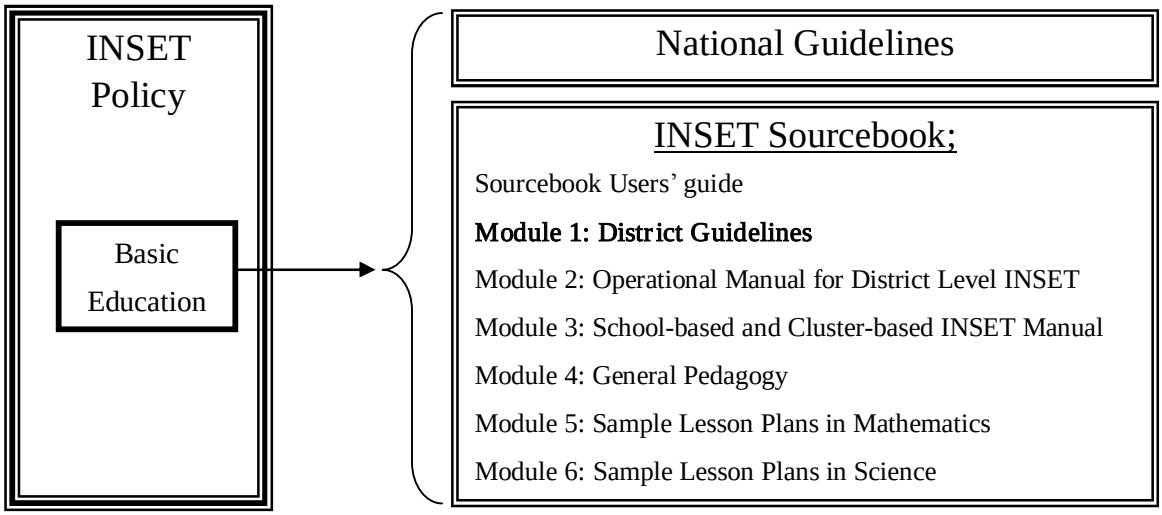

Figure 1: Relation between INSET Policy and Related Documents

The purpose of the district guidelines is to give an overview of the organizational structure of the INSET programme at the district level, so that all the stakeholders at the level can understand what kinds of activities are expected to be implemented at the district level, which of the stakeholders is responsible for each activity in the district.

The content of the district guidelines is as follows:

- Overview of INSET Programme
- INSET Roles and Responsibilities
- Activities of INSET Programme at the District Level

2. Overview of INSET Programme

2.1. Overview of the Structure of INSET Programme

The structure of the INSET programme comprises three levels, namely National, District and School levels. Each level has specific roles to play towards the successful implementation of the programme. Their simplified structure is shown in Figure 2.

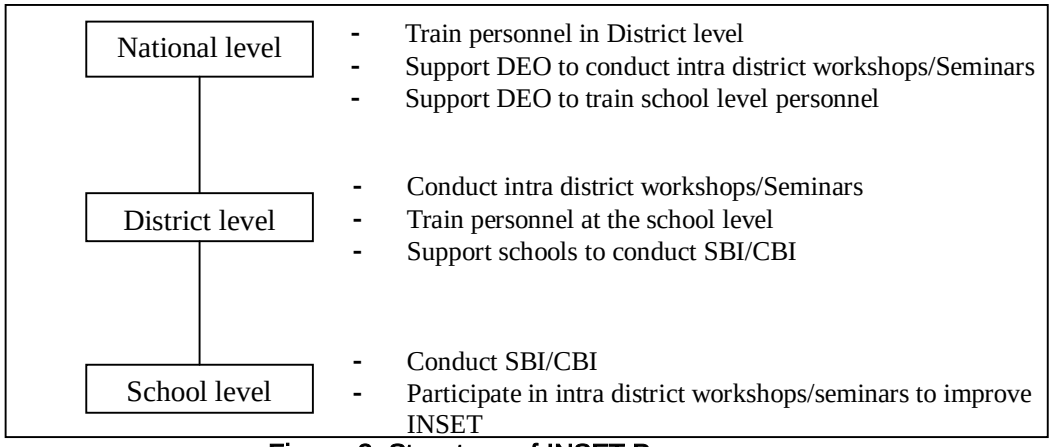

Figure 2: Structure of INSET Programme

2.2. Guiding Documents Related to each level

Several documents have been prepared for the implementation of the whole INSET programme. These are National Guidelines and INSET Sourcebook which consists of six modules (the number of modules may be increased in the future). These documents provide a guide for implementing the programme at the national, district and school levels. The structure of the documents is shown in Figure 3.

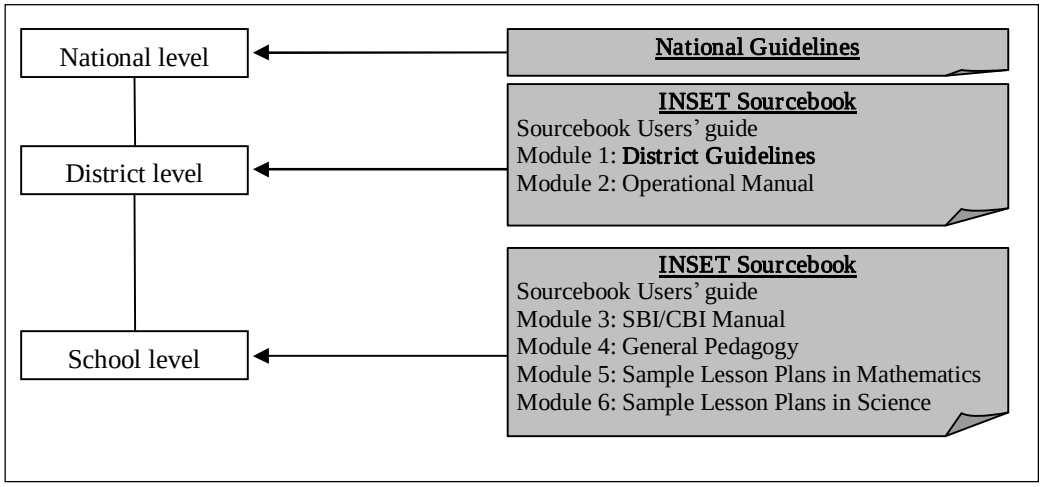

Figure 3: Structure of Guiding Documents Related to Each Level

2.3. Key Players of the INSET Programme

Personnel at each level are divided into two groups; one is responsible for administrative matters and the other is responsible for the facilitation of the INSET activities. Figure 4 illustrates the two groups for administrative and facilitation matters at each level.

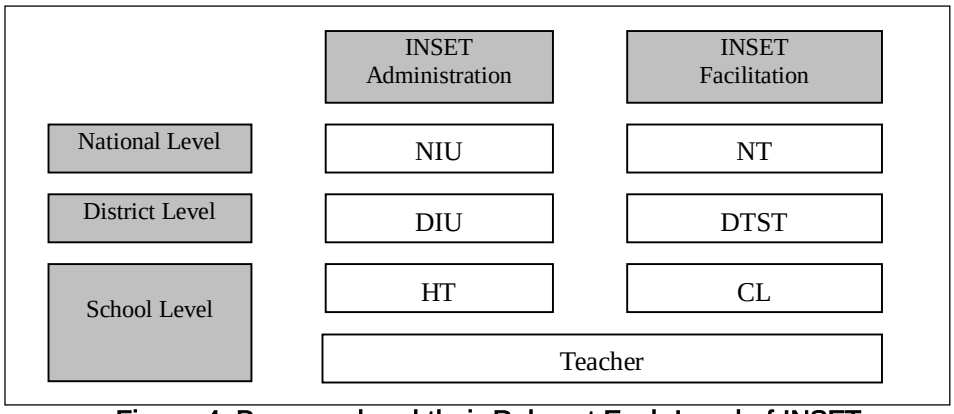

Figure 4: Personnel and their Roles at Each Level of INSET

For instance, at the national level, the National INSET Unit (NIU) is in charge of administration and the National Trainers (NT) take care of the facilitation of the INSET. At the district level, the District INSET Unit (DIU) is responsible for administration and District Teacher Support Team (DTST) takes care of the facilitation. The DIU belongs to District Education Office (DEO). Some of the DTST members also belong to DEO. At the school level, moreover, Head Teacher (HT) and Curriculum Leader (CL) mainly take responsibility of administration and the facilitation respectively.

2.4. Structure of the INSET Programme

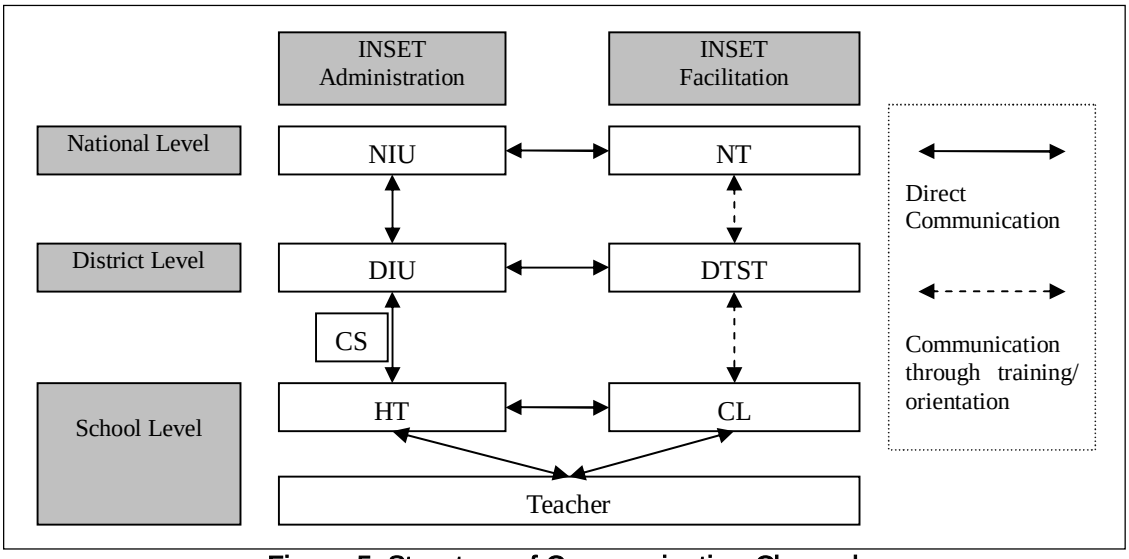

Figure 5: Structure of Communication Channel

To implement INSET successfully, it is necessary to establish structured and standardised communication among the key players of the INSET programme. Figure 5 shows a structure of

such communication channel.

The groups of the personnel described in Figure 4 are the key players of the INSET programme. They give training/orientation to other key players of the INSET programme and they also receive training/orientation from other key players. For example, National Trainers give training to DTST while CL and HT receive training/orientation activities from DTST. Figure 6 shows the structure of the training/orientation activities among the key players of the INSET programme.

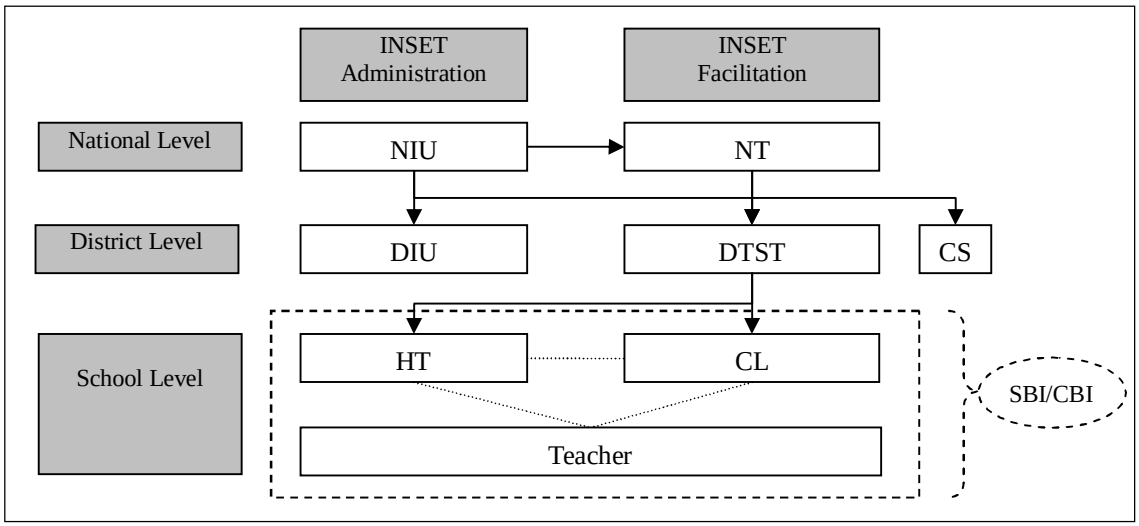

Figure 6: Structure of Training/Orientation Activities among Key Players of INSET Programme

The arrows indicate the directions of the flow of training/orientation activities. Some of the directions are from higher levels to subsequent levels. However, it should be noted that, SBI/CBI at the school level does not have to be this way at all. SBI/CBI places emphasis on collegial learning and sharing where teachers learn from their colleagues, i.e. teachers.

2.5. Information Management System

In order to improve the INSET programme, there is the need to collect, store, share and utilize the information on the programme among all the stakeholders. Well-managed information is easily analysed and shared among the stakeholders, and this leads to a better planning. To manage information effectively, it is important to standardise the procedure and items to be collected, so that all the stakeholders can understand who collects the information and how it is collected.

Information Management System is structured collection and management of relevant information. It is described in Figure 7. The figure shows that there are two main lines of information-flow in the Information Management System:

1. Flow of information for self-improvement (indicated in dotted arrows)
2. Flow of information for reporting to upper levels (indicated in bold arrows)

The first flow means the utilization of information for self-improvement at the school, district and national levels. Self-improvement involves the process whereby the facilitators will utilize lessons learnt to improve the following programmes within the same levels through analyzing the training/orientation programmes.

For instance, at the district level, we can regulate the planned budget better through analysing the information gathered that are related to all the training/orientation programmes within DEO. We can also make a better arrangement of time schedule and venue for the next year.

The second flow means to report information on the implemented INSET programmes to upper levels. Through reporting the information, the personnel at upper levels can be aware of the programmes at lower levels. If they are aware of that, not only can they give the personnel at the lower levels some feedback in order to improve the following programmes, but can also revise and enrich the National Guidelines and INSET Sourcebook (District Guidelines) based on the concrete experience of conducting INSET programme.

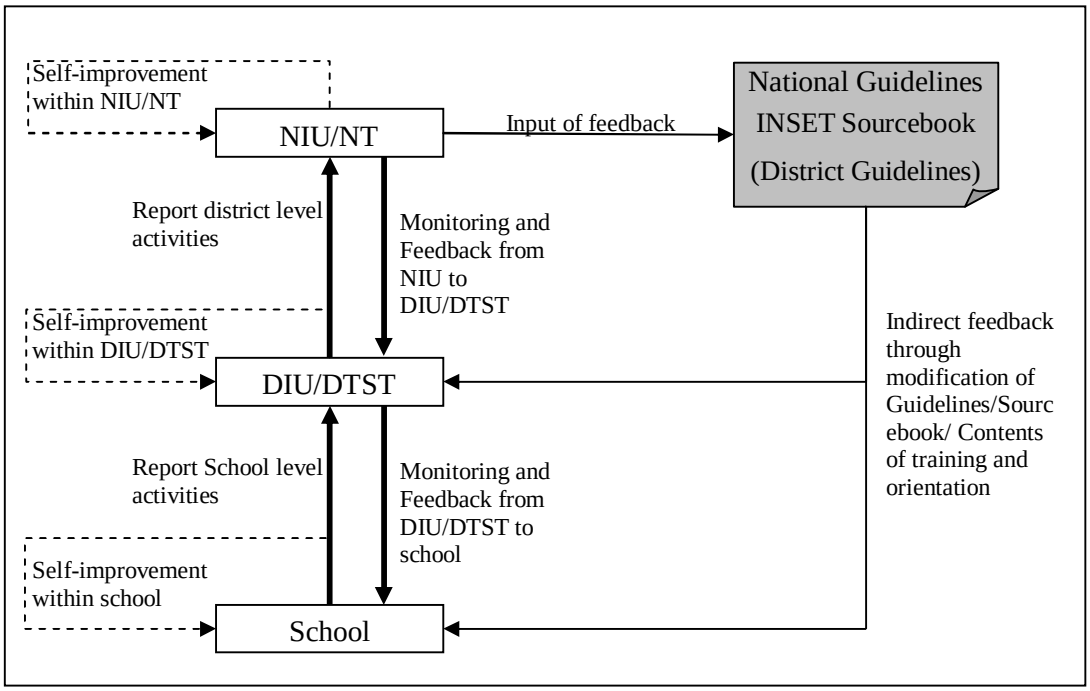

Figure 7: Information Management System

3. INSET Roles and Responsibilities

3.1. District INSET Unit (DIU)

DIU will be located at the DEO. Each district will decide on the number of staff to be assigned to the DIU, in accordance with the requirements of the INSET programmes at the district level.

Table 1: Terms of Reference and Recommended Composition of DIU

Terms of Reference	Recommended Composition
– Be responsible for administrative matters. – Transfer information from NIU and school level to DTST appropriately and vice versa. – Select DTST members.	– AD Supervision – AD Human Resource – District Training Officer – Budgeting Officer – Head of DTST

3.2. District Teacher Support Team (DTST)

DTST is expected to play a critical role in the operationalization of the INSET programme at the district level. Members of the DTST are required to play a lead role in the facilitation of district INSET programmes. Their main role is also to carry out monitoring and evaluation of the programmes. The members are expected to train CLs and review the impact of the work of CLs based on their own monitoring and the reports supplied by HTs.

Table 2: Terms of Reference and Recommended Composition of DTST

Terms of Reference	Recommended Composition
– Work as a team to implement each activity. – Take responsibility for quality control. – Support the Head Teacher together with the CS to select CL.	– District Training Officer – Three persons who are, or have been circuit supervisors/head teachers – Two persons who have English teaching experience – Two persons who have Science teaching experience – Two persons who have Mathematics teaching experience

3.3. Curriculum Leader (CL)

CL plays a vital role in the facilitation of SBI/CBI activities. According to the INSET programme, they are expected to work under the guidance of the HTs in the organisation and delivery of SBI/CBI.

Their main responsibility is to sensitise teachers and organise effective SBI/CBI.

Table 3: Terms of Reference for CLs

Terms of Reference
– Do effective sensitisation of teachers about SBI/CBI. – Organize (Plan, Do, See, Improve) effective SBI/CBI for teachers. – Organise SBI/CBI on good practices and record keeping on a regular basis in schools, at least 2 times a term. – Be very approachable and willing to help other teachers to overcome their difficulties in handling challenging topics in the primary syllabus.

A CL is not same as a Lead-teacher. A Lead-teacher is given the position on account of his/her interest and expertise in a particular topic in a subject area. But a CL is given the position as a coordinator of SBI/CBI, and the number of CLs in a school is supposed to be one in principle.

3.4. District Director of Education

INSET Responsibilities	Related INSET Tasks
– Supervise all activities at the district directorate with regards to administration and instructional delivery of INSET.	– Ensure that the budget officer, AD supervision and training officer plan and budget for INSET, and incorporate it into the annual District budget.
– Co-ordinate and supervise all educational interventions for INSET promotion.	– Inform and coordinate with National INSET Unit about all planned INSET activities.
– Ensure that district office personnel charged with assisting and monitoring INSET are adequately resourced to ensure they are effective.	– Put in place a well structured DTST. – Enhance the capacity of CS for effective monitoring and supervision of INSET.
– Ensure that teachers' performance is assessed through the monitoring of lesson planning and presentation.	– Review Teacher Performance Monitoring results and feedback through Performance and Appraisal Meetings.

3.5. Assistant Director - Supervision

INSET Responsibilities	Related INSET Tasks
– Co-ordinate the activities of CS and report to the DDE	– Monthly meetings and compilation of reports from CS
– Monitor the activities of the schools to see if CS are performing their roles effectively	– Regular visits to circuits and schools

3.6. Assistant Director - Human Resource

INSET Responsibilities	Related INSET Tasks
– Ensure that there is a equitable distribution of teachers with Science and Mathematics background to the schools	– Should know the background of teachers before posting is done
– Regulate transfers and make sure that newly trained teachers remain in their schools for at least three years	– Liaise with Regional managers to restrict transfers

3.7. Training Officer

INSET Responsibilities	Related INSET Tasks
– Organise head teachers' sensitisation meetings and INSET for CLs	– Conduct needs analysis on challenging topics and coordinate the various activities of INSET in the various schools based on the needs. – In collaboration with the accountant, prepare a comprehensive budget for head teachers' sensitisation, CL training and CS capacity building, and administer the training budget

3.8. Budgeting Officer

INSET Responsibilities	Related INSET Tasks
– Give DIU advice related to budgeting	– Support DIU to prepare Planning Paper of each activity and Annual Action Plan

3.9. Circuit Supervisor (CS)

INSET Responsibilities	Related INSET Tasks
– Keep records of all SBI/CBI activities of the schools responsible.	– Visit schools during SBI/CBI for first hand information and request reports from the schools/HTs
– Assess the performance of teachers through the monitoring of lesson planning and presentation.	– Use monitoring and information management tools to assess the performance of teachers
– Assist schools in organising and delivering INSET	– Monitor the activities of the schools to ensure that the HT has sensitised the staff and the initial preparations for SBI/CBI have been put in place – Facilitate SBI/CBI when necessary, for example through demonstration lessons
– Assist in the selection of CL in accordance with criteria	– Liaise with HT and teachers to select a suitable person as CL

3.10. Head Teacher (HT)

INSET Responsibilities	Related INSET Tasks
– Select CL	– Select CL in collaboration with members of staff and in accordance with the criteria
– Sensitise staff about the CL training concept, its implication and the importance of SBI/CBI programmes	– Organise meetings for CLs to brief the staff after every CL training
– Sensitise the community about the professional development of the teachers through advocacy and information sharing	– Call PTA meetings, hold open days, speech and prize giving days and use capable persons from the community as resource persons
– Organize effective SBI/CBI with CL	– Carry on needs assessment, planning, budgeting, preparation and monitoring and evaluation for SBI/CBI

3.11. Teacher

INSET Responsibilities	Related INSET Tasks
– Assist the HT to maintain discipline in the CL's class when on training or special assignment	– Combine CLs class with their own class or give assignments to the pupils
– Collaborate with HT and CL to prepare action plan	– Submit challenging topics and contribute to discussions for the running of SBI/CBI
– Assist CL to prepare adequately for the SBI/CBI	– Prepare TLMs, give professional suggestions and facilitate SBI/CBI when necessary
– Implement improved teaching and learning activities from SBI/CBI	– Implement instructional plans – Develop skills in teaching methodology and delivery – Implement improved classroom organisation and management practices

4. Activities of the INSET Programme at the District Level

4.1. INSET Training/Orientations

1) HT orientation

The objectives of the orientation are to enable HTs to:

- understand the INSET Model and SBI/CBI in the model
- select CL
- sensitize colleague teachers on the purpose of SBI/CBI and the role of others in SBI/CBI
- incorporate SBI/CBI budget into School Performance Improvement Plan (SPIP)
- assist CL to develop annual plan for SBI/CBI at school level
- monitor and evaluate all the activities of SBI/CBI

2) CL orientation

The objectives are to enable CLs to;

- understand the INSET Model and SBI/CBI in the model
- sensitise colleague teachers regarding the purpose of SBI/CBI and the role of others in SBI/CBI
- develop annual plans for SBI/CBI at school level
- budget for SBI/CBI at school level
- monitor and evaluate all the activities of SBI/CBI

3) CL sourcebook training

The objectives of the first training are to enable CLs to:

- carry out one or two Mathematics demonstration lesson(s) by referring to module 5
- carry out one or two Science demonstration lesson(s) by referring to module 6
- facilitate at least two SBI/CBI sessions in a term
- assist in the identification of challenging topics

The objectives of the second training are to enable CLs to:

- share their experiences of SBI/CBI in their schools
- identify challenging issues and good practices of SBI/CBI through discussion
- find solutions to the challenging issues
- examine factors that have made the good practices possible
- share the challenging topics that they have brought from their own schools
- discuss the challenging topics with DTST with respect to teaching and learning contents and methodology
- find effective ways of teaching the challenging topics with prepared lesson plans

4.2. Meetings for Sharing INSET Information

1) Information Exchange Seminar

The overall goal is to:

- share the lesson learnt between CL and DEO so that INSET programme will be improved at the national-level, district-level and school-level.

The objectives are to:

- share progress in the implementation of SBI/CBI
- share best practices of INSET implementation and lessons learned
- share feedback from Sourcebook users

2) Annual Implementation Meeting

The objective is to:

- confirm and disseminate timing, size and budget of each INSET activity in the district for the next fiscal year among all stakeholders in the district.

4.3. Monitoring and Evaluation (M&E)

In order to realize continuous improvement in the INSET programme, there is the need to conduct monitoring and evaluation (M&E) on the programme. At the district level, there are two types of M&E as follows:

- M&E of the training/orientation at the district level
- M&E of SBI/CBI

The first is to monitor and evaluate the training/orientation programmes at the district level, such as HT/CL Orientation and CL Sourcebook Training. The second is to monitor and evaluate SBI/CBI at the school level.

DIU, DTST and CS are supposed to be in charge of those M&E.

4.4. Dissemination and Public Awareness raising

Dissemination and Public awareness raising are the processes whereby INSET-related information such as SBI/CBI is delivered to groups of people (chiefs, district assemblies, DEOs, NGOs, SMC, PTA, teachers and parents). The purposes of dissemination and public awareness creation are as follows:

- To ensure that key stakeholders in the community are sensitised enough to be aware of the goals and benefits of the INSET programme;
- To encourage teachers and heads of schools to do their best to achieve the goals;
- To give other stakeholders in the district a sense of involvement, commitment and confidence in the efforts of the INSET programme.

4.5. Model of the INSET Programme

Table 4 gives a model of the INSET programme, which is made up of several training programmes. The table shows the model with recommended training programmes. Note that the model is subject to change and can be modified to meet new challenges.

Table 4: Summary of Recommended INSET Activities

Type	INSET Activity	No. of Days	Venue	Trainers / Facilitators	Trainees/ Participants
From National level to District Level	Orientation for District Education Office	2 days	DEO	NIU or NT	DDE, DIU, Budgeting officer, Head of DTST, District Assembly
	Orientation for DTST	1 day	DEO	NIU or NT	DTST
	Sourcebook Training for DTST	4 days	DEO	NIU or NT	DTST
	Training on Information Management System	2 days	DEO	NIU or NT	DIU, DTST
	Monitoring of district level programmes by NIU/NT	N/A	DEO	NIU or NT	N/A
From District level to School level	HT Orientation	1 day	School Cluster or DEO	DTST	HT, CS
	CL Orientation	2 days	School Cluster or DEO	DTST	CL
	CL Sourcebook Training	5 days x 2	School Cluster or DEO	DTST	CL
	Monitoring of school level programmes by DEO	N/A	School	N/A	N/A
Intra district	Information Exchange Seminar	1 day per term	DEO	DIU, DTST	HT, CL
	Workshop	N/A	DEO	DIU, DTST	HT, CL, teachers, others
	Annual Implementation Workshop	1 day per year	DEO	DIU, DTST	DDE, DTST, CS, District Assembly, HTs, PTA, SMC
	Meeting to support activities in DEO	N/A	DEO	N/A	N/A
School level	School-Based INSET	At least 2 times per term	School	HTs CLs	Teachers
	Cluster-Based INSET		Host school	HT of host school CL of host school	All teachers in a cluster

Module 2: Operational Manual for District Level INSET

Users:

All personnel at the district level, including DTST and DEO

Objectives of this Module

Module 2 is an operation manual that describes the general operation of the In-Service Training (INSET) activities at the district level. It elaborates how the INSET activities can be planned, implemented and evaluated efficiently. It highlights how to improve the INSET activities by utilising lessons learnt from similar activities conducted in the past. Module 2 also explains how to manage human resource of the INSET activities. In addition, the module shows some ways of raising public awareness about INSET.

The INSET activities at the district level are designed to strengthen the competencies of INSET key players at the district level as well as at the school level. It is expected that the use of this manual in the implementation of the INSET activities, will help enhance the competencies of the INSET key players at the district level. Head Teachers (HT) and Curriculum Leaders (CL), who play a vital role in School-based INSET (SBI) and Cluster-based INSET (CBI), will receive training/orientation on the use of this manual. It is believed that HT and CL will successfully support and facilitate SBI/CBI after receiving the training/orientation.

The Appendices provide procedures and content of specific INSET activities. These are:

Annual Implementation Workshop, HT Orientation, CL Orientation, CL Sourcebook Training, Information Exchange Seminar, other workshops and Monitoring for SBI/CBI.

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1. Plan-Do-See Cycle and Improve

This section describes procedures that ensure efficient delivery of INSET activities. INSET activities can be systematically organised using the following stages.

- **P**lan stage: Planning
- **D**o stage: Implementation
- **S**ee stage: Monitoring and evaluation

1.1. Plan-Do-See Cycle

The Plan-Do-See Cycle starts from "Plan" and move to "Do". "Do" is followed by "See". The main idea of this cycle is that proper planning (Plan) is always needed before implementation (Do); after implementation (Do) it is also necessary to carry out systematic monitoring and evaluation (See). What this procedures emphasises is the cycle that brings about continuous progress.

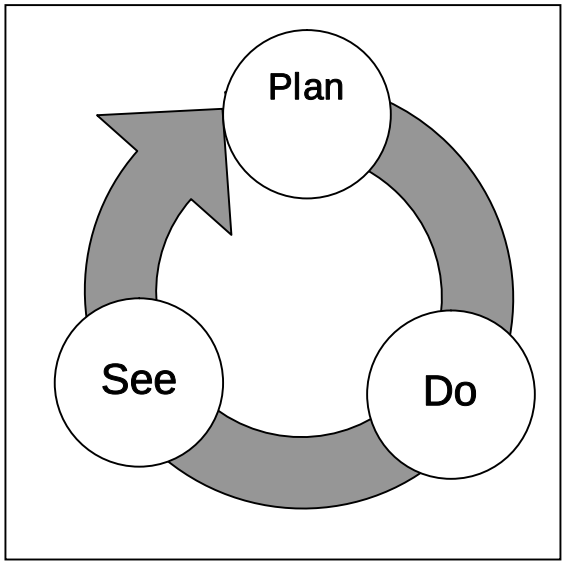


Figure 1: Plan-Do-See Cycle

1.2. "Improve"

Through conducting the Plan-Do-See Cycle, implementers are expected to gain various insights and experiences about the operation of the INSET activities. They need to identify which of these experiences are more important and helpful in the implementation of the INSET activities. By doing so, suggestions for a better operation should be made. This suggestion should **improve** the operation of the next cycle, leading to a continuous progress. A Plan-Do-See Cycle should improve the whole process of the next cycle.

To help this continuous progress occur, it should be noted that a better planning is particularly needed. One must use suggestions from a previous cycle to improve the planning of the next cycle. A helpful suggestion should be made through monitoring and evaluating in the See stage. Thus, monitoring and evaluation (**See**) are crucial to the next cycle. Although the whole cycle improves the next cycle, it is often the See stage that **improves** the next planning (**Plan**). Wise use of "See" improves "Plan".

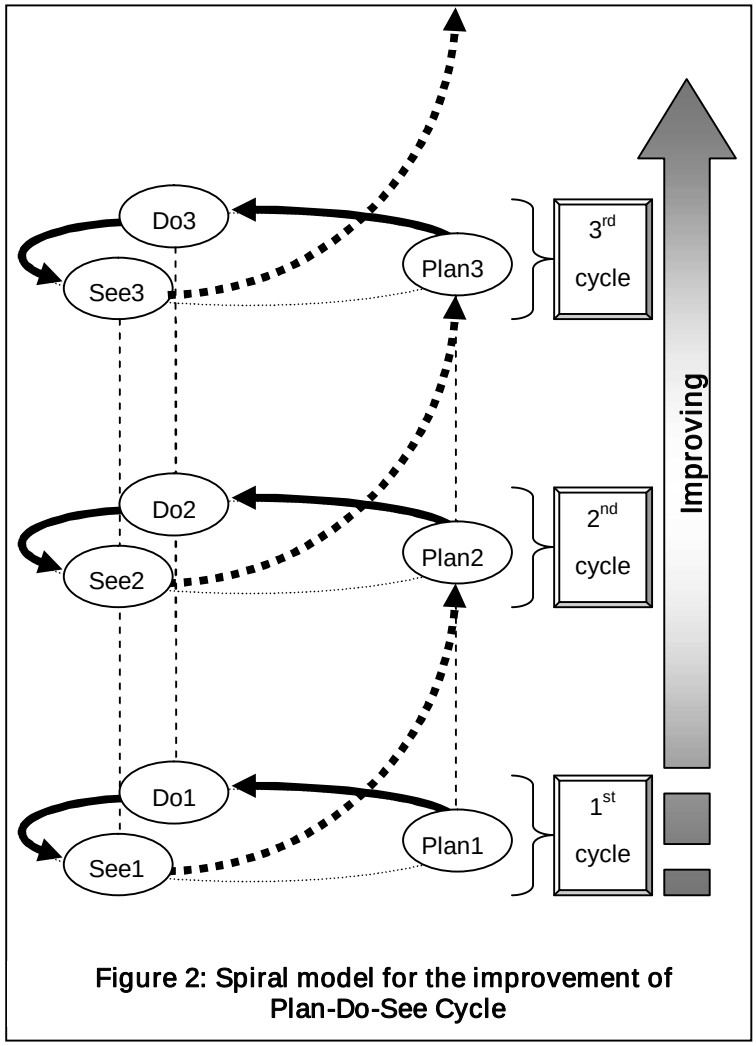


Figure 2: Spiral model for the improvement of Plan-Do-See Cycle

Figure 2 illustrates the idea of improving the Plan-Do-See Cycle. Note that the results of See stage (monitoring and evaluation) are specifically used in Plan stage (planning). The second cycle (shown in the middle of the figure) improves its activities by utilising lessons learnt from the first cycle (bottom of the figure). Likewise, the third cycle (top of the figure) improves its activities based on experiences from the second cycle. In this way, the quality of administration and training content is expected to improve continuously.

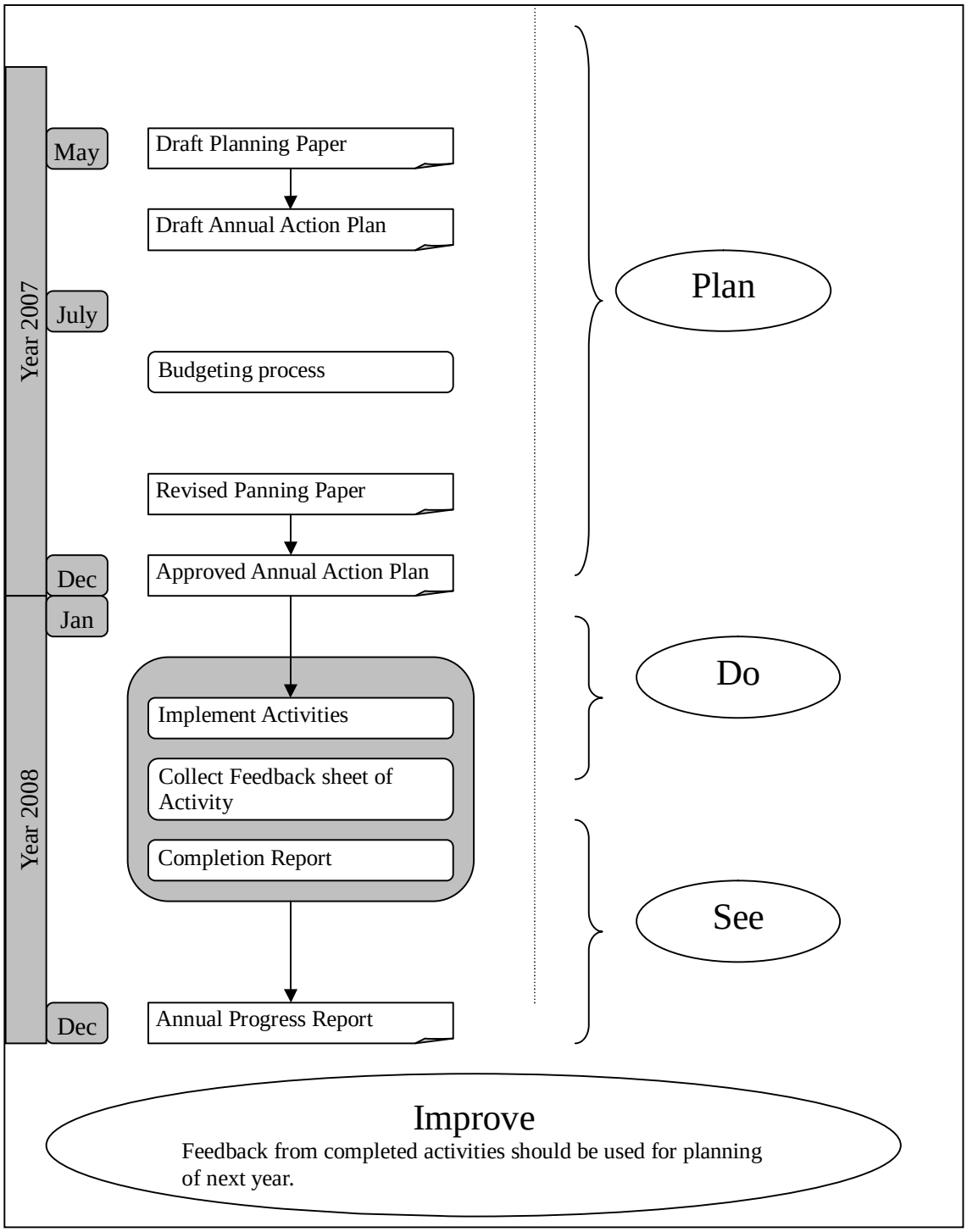


Figure 3: Plan-Do-See Cycle and INSET procedure

To ensure successful implementation (Do) of INSET activities, it is significantly important to plan the INSET activities well ahead. For example, INSET activities for the year 2008 require their planning in the year 2007, a year ahead. This is shown in Figure 3 above. Monitoring and evaluation (See) follow the implementation of the INSET activities. Feedback from completed INSET activities should improve planning of INSET activities in the following year.

1.3. Linkage between existing education activities and INSET programme

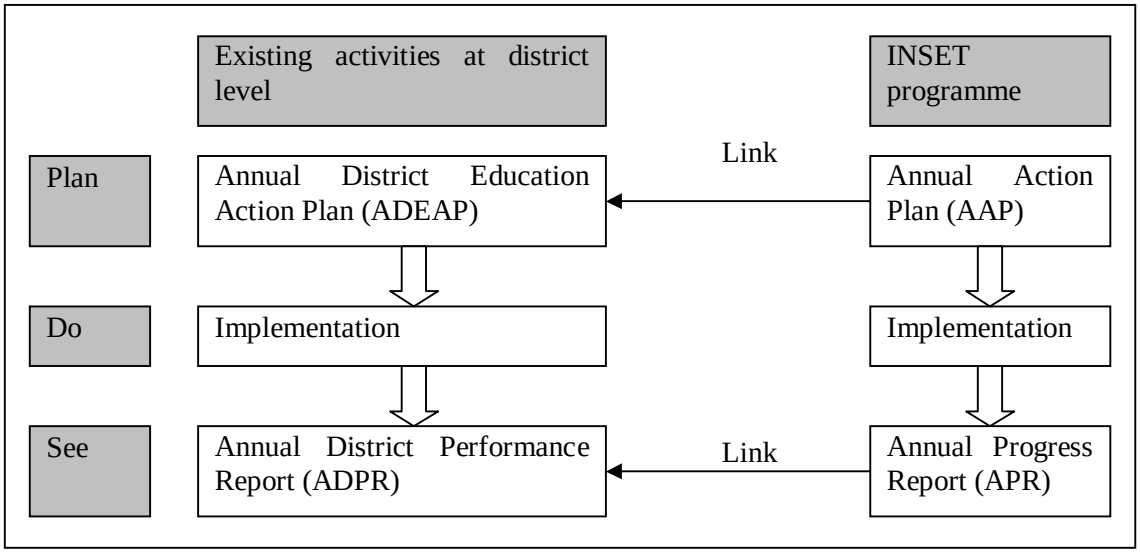


Figure 4: Linkage between Existing Education Activities and INSET Programme

The Plan-Do-See cycle is already used in the cycle of planning, budgeting, monitoring and evaluation at the district level. Annual District Education Action Plan (ADEAP) is a summarization of "Plan" stage in the district; whereas Annual District Performance Report (ADPR) is a summarization of "See" stage.

When comparing the existing process of educational activities at the district level and INSET programme, there is not a significant difference. Annual Action Plan (AAP), which is a summarization of "Plan" stage in the INSET programme, is equivalent to ADEAP. Likewise, Annual Progress Report (APR) of the INSET programme is equivalent to ADPR.

It should be noted that INSET programme is under the existing process. For example, ADEAP takes responsibility for the budget of a district. Thus, summary of AAP should be put into ADEAP. Therefore, AAP should be completed before ADEAP is completed.

Correspondingly, summary of APR should be put into ADPR. Therefore, APR should be completed before ADPR's completion.

In the future, the process of INSET programme should be integrated fully into the existing process of educational activities at the district level.

1.4. Comparison of tasks between District INSET unit and DTST

During the Plan-Do-See cycle, DIU and DTST have distinct tasks for each stage. Table 1 shows the tasks of them along the cycle separately.

Table 1: Comparison of Tasks between District INSET Unit (DIU) and District Teacher Support Team (DTST) during Plan-Do-See Cycle

	DIU	DTST
Plan	• Prepare Planning Paper (PP) of each Activity with support from DTST.	• Support DIU to prepare draft PP
	• Complete Draft AAP and transfer it to NIU.	• Support DIU to complete Draft AAP.
	• Go through budgeting process with budgeting officers.	• N/A
	• Revise PP of each activity to meet budget approved.	• Support DIU to revise PP of each activity.
	• Complete "Approved AAP" and transfer it to NIU.	• Support DIU to complete "Approved AAP".
	• Mobilise human and capital resources to meet with AAP.	• N/A
Do	• As an administrator, support DTST to implement INSET programmes at the district level	• Implement INSET programmes at the district level.
		• CL training: – Deliver SBI/CBI methodology. – Lead participatory sessions on class observation, lesson study, and INSET monitoring. – Familiarise CL with the use of Sourcebook, which of the key reference document for CL training and SBI/CBI.
		• Information Exchange Seminar: – Facilitate it. – Review implementation of SBI/CBI. – Share information on good practices. – Share information on use of sourcebook.
	• Collect "Activity Completion Sheet (ACS)" that DTST prepared and transfer it to NIU.	• Prepare ACS on each activity and submit it to DIU. – Conduct training needs assessment of teachers from Information Exchange Seminar feedback and head teacher monitoring reports. – Assess impact of SBI/CBI using monitoring reports from head teacher and Circuit Supervisors (CS)
See	• Support DTST to Monitor INSET programme at the district level.	• Monitor INSET programme at the district level.
	• Complete "Annual Progress Report (APR)" with collected Completion Report which DTST prepared. • Transfer it to NIU.	• Support DIU to complete "APR".

DIU and DTST also have different tasks for SBI/CBI. Table 2 shows the tasks of them separately.

Table 2: Comparison of Tasks between DIU and DTST for SBI/CBI

	DIU	DTST
SBI / CBI	Support DTST for a better SBI/CBI	• Support CL, HT and CS to conduct SBI/CBI. • Assist teachers to gain expertise in their subject areas • Establish clear expectations and constructive working relationships with HTs and teachers in schools • Evaluate teaching and use the analysis to inform effective practice and areas of improvement, and take action to further improve the quality of teaching

2. Operation manual at the "Plan" stage

The "Plan" stage is a key stage for the success of the whole INSET programme. This stage mainly involves the planning of district level INSET activities and an action plan for the year.

2.1. Roles and Responsibilities

The DIU is in charge of planning INSET activities at the district level and the DTST needs to support DIU in the course of planning. After finalising the plan for the INSET activities, they develop an action plan for the year.

The plan of an INSET activity is called "Planning Paper (PP)". The **DIU** and the **head of DTST** are responsible for writing the PP.

The action plan for the year is called "Annual Action Plan (AAP)". **DIU** and **head of DTST** are also responsible for drawing up the "AAP".

Note that it is important to make a **draft** of every PP and a draft of AAP.

Table 3 summarises roles and responsibilities of DIU and DTST at the Plan stage.

Table 3: Roles and responsibilities of DIU at the Plan stage

Groups	Roles and Responsibilities
DIU and Head of DTST	• Draw up **Planning Papers (PP)** (including drafts) of INSET activities with support from **DTST**. • Draw up **Annual Action Plan (AAP)** (including a draft).
DTST	• Support DIU to prepare **PP** of each activity.

2.2. Procedures in "Plan" stage

2.2.1. Overall procedures

Generally, the planning of INSET activities follows the procedures written below.

1. DIU and DTST members select INSET activities to be conducted in the district, depending on their needs.
2. DIU and head of DTST prepare a draft PP for each of the selected INSET activities with support from the other DTST members.
3. DIU and head of DTST draw up a draft AAP based on the prepared PP.
4. The draft of AAP, incorporated into ADEAP, is reviewed for budgeting.
5. DIU and head of DTST revise the drafts of PP when necessary.
6. AAP is approved (ideally, as a component of the ADEAP) by District Director of Education (DDE).

Figure 5 shows the flow of the processes at the "Plan" Stage.

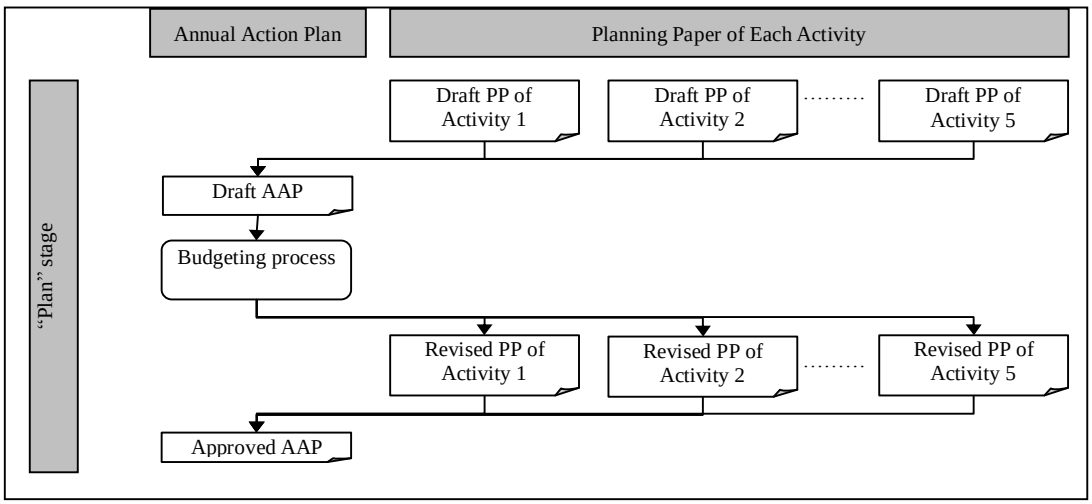


Figure 5: Flow of the Processes at the Plan Stage

As it can be seen, writing the PP and the AAP is a very important and major task at the planning stage. The following sections explain how to write the PP and AAP.

2.2.2. Planning Paper

The Planning Paper (PP) comprises two major elements: **planning** and **budgeting**. There are separate forms prepared for the planning and budgeting parts in the PP, namely "PP for Activity (Form 1 (1/4))" and "Planning of Budget for Activity (to be provided as an electronic document, Form 1 (4/4))". Every INSET activity requires both of them as shown in Figure 6 below:

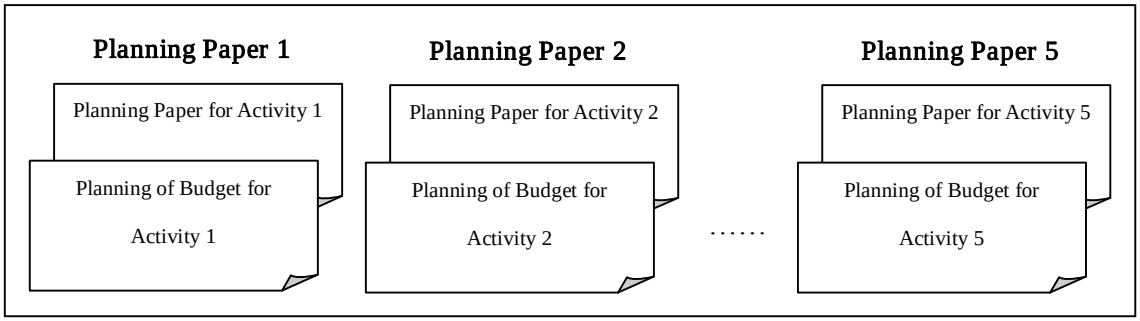


Figure 6: Composition of PP

When writing the PP, there are several points to be considered. Some of these arrangements are shown below.

- Participants
- Trainers/facilitators
- Location
- Timing
- Budget

It is very important to utilize lessons learnt from the previous year when considering these

arrangements for the planning. The following explains the arrangements in detail.

1. Participants

- Determine how many times the INSET activity should be organised to cover all the expected participants in the district.

  For example, if the total number of expected participants is 100 and one workshop accommodates 20 people at a time, it means that the same workshop should be organised 5 times to cover all. In other words, the INSET should be organised in 5 batches.

- Avoid inviting those who have already participated in the training with similar content.

  To make the training cost-effective, it is necessary to determine the appropriate number of participants to invite. When planning the number of participants, check the Record of Orientation/Training for HT and CL (ROOT) form, which is the record that provides information on the Orientation/Training that HTs and CLs have already participated in. This process should help the planner to avoid inviting the same person again. Use the form "List of Participants" (Form 1 (2-3/4)).

- Increase attendance rate at the training programme

  Get a confirmation of attendance from the participants well in advance of the INSET activity. This process should help the planner to avoid ordering meals for those who are not coming. Make participants' attendance sheet.

2. Trainers/facilitators

- Facilitators for each INSET activity are described in Appendix 1 of this module. The HT and CL will have been trained as facilitators of SBI/CBI activities through the HT/CL orientation, and CL training.

3. Location

The venue for the INSET activity should be decided considering the number of the participants and facilities they need. A suitable venue would be:

- Centrally located in the district or located in each cluster (easily accessible for participants); and
- Large enough to accommodate all participants.
- A place with the necessary equipment.

To ensure cost effectiveness, the training budget has to be reasonably utilised. Where possible it is proposed that public facilities such as Senior Secondary School (SSS), Teacher Training College (TTC) and schools are used as venues for the INSET activities. Cost of transport and accommodation should be kept at the minimum.

4. Timing

Some of the INSET activities need to be carried out earlier than others. For example, HT Orientation must be done before CL Orientation as HT Orientation deals with the selection of CL, which partly determines the success of CL Orientation. Recommended sequence of orientation and training is shown below.

1) HT Orientation → 2) CL Orientation → 3) CL Sourcebook Training

When planning INSET activities, it is important to take the academic calendar of the District/School activities into consideration. The activities should be planned in such a way that they do not clash with other activities such as culture, sports, etc.

It is also important to consider the availability of the trainers/facilitators. They might be engaged in some other activities on the schedules for the INSET activities. It is necessary to check the schedules of the trainers/facilitators before the INSET activities take place. This should be discussed in the Annual Implementation Workshop. This means that the organisers have to plan the Annual Implementation Workshop prior to the other INSET activities.

5. Budget

Securing funds is crucial to the running of the INSET programme. It is, thus, significantly important to involve the district assembly. Consider securing funds not only from the consolidated funds of the Ministry, but also from other sources. Examples of other sources are shown below.

Table 4: Sources of Funding

Main Source of funds for INSET			Others
GOG (Service Activity)	GOG (Capitation Grant)	District Assembly Common Fund	– Development Partners' funding – NGOs support – Internally Generated Funds

2.2.3. Annual Action Plan (AAP)

The Annual Action Plan (AAP) is made up of:

- Cover Page (Form 2 (1/3))
- Summary of Activities and Budget (Form 2 (2/3))
- Summary of Schedules (Form 2 (3/3))
- PP of all the INSET activities (Form 1)

2.2.4. Budgeting process

Budgeting process varies depending on the source of funding. The possible sources are shown in Table 4.

If the source is the GOG (service activity), DIU has the responsibility to incorporate the budget of the AAP into the ADEAP, to ensure that the needed funds for the district level INSET activities will be catered for under the district's annual budget plan.

2.2.5. Revised PP and Approved AAP

In the light of the budget approved, a revision of the PP and the AAP takes place. The revision often requires a cut-down of cost. Effective ways of cutting down cost are presented below.

- Reduce the number of participants
- Reduce the number of training programmes to be organised
- Cut down the unit cost
- Change the venue for the activity to reduce the travel cost.

2.3. Submission of Documents with Schedules

For smooth planning, developing a schedule is strictly required. Figure 7 shows documents required at the "Plan" stage and recommended submission schedule. It should be noted that the schedule shown is based on the schedule of the Medium Term Expenditure Framework (MTEF), provided the source of funding is GOG (service activity). Obviously, preparation and submission of the required documents need to be linked with the district's annual planning and budgeting cycle. Those documents are also supposed to be sent to the National INSET unit (NIU), so that the NIU can make a large contribution in order for the planners to improve their planning and budgeting indicated in the documents.

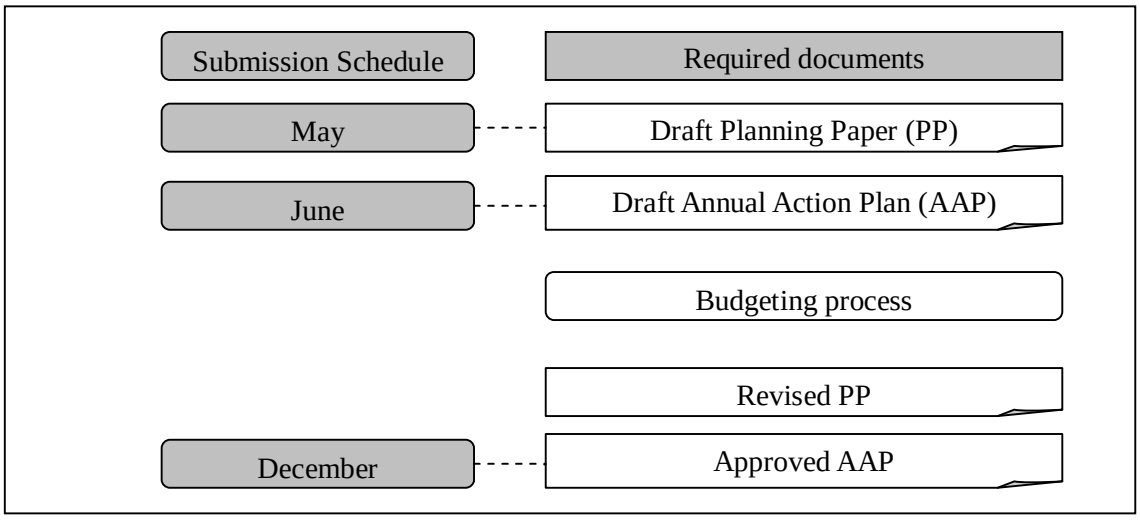


Figure 7: Documents Required at the Plan Stage and Recommended Submission Schedule

3. Operation manual at the "Do" stage

This section explains how to carry out the "Do" stage, bearing in mind the general procedures of the INSET activities at the district level. The specific procedures and content of each can be found in Appendix 1 of this module.

Table 5 shows the training/orientation programmes, which are supposed to be implemented at district level:

Table 5: List of Training/Orientation Programmes at the District Level

No.	Training/Orientation	Trainer/Facilitator	Page
1	HT Orientation	DTST	pp.39-45
2	CL Orientation	DTST	pp.46-51
3	CL Sourcebook Training	DTST	pp.52-62
4	Information Exchange Seminar	DIU, DTST	pp.63-66
5	Annual Implementation Workshop	DIU, DTST	p.67
6	Other Elective Workshop	HT, CL, Teachers or Others	pp.68-71

3.1. Roles and Responsibilities

As you can see from Table 4, DTST is supposed to be the key player in the implementation of the training/orientation programmes at the district level. DIU also has the responsibility of conducting some activities such as Information Exchange Seminar and Annual Implementation Workshop with the cooperation of the DTST. However, DIU is basically expected to support DTST to implement the training/orientation programmes. You can see a more detailed list of roles and responsibilities for each activity in the appendices of this manual.

3.2. Procedures at the "Do" stage

3.2.1. Overall Procedures

At the Do stage, there are mainly four steps, namely Resource Preparatory Meeting, Confirmation, Preparation and Implementation. An explanation of each of the steps is given below. Figure 8 shows the steps.

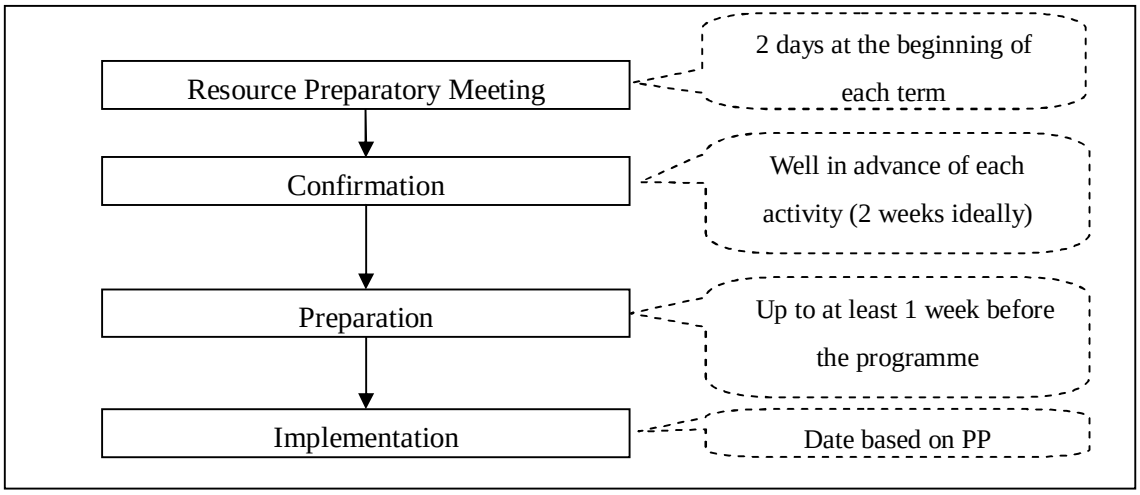


Figure 8: Steps of "Do" Stage

3.2.2. Resource Preparatory Meeting

A Resource Preparatory Meeting is supposed to be held at the beginning of each term for two days. DIU is in charge of holding the meeting. In the meeting, the DIU, DTST and CS are expected to gather and discuss all the activities in the term, so that each of the activities will be well planned and properly prepared.

Especially, there is the need to confirm that the following have been catered for: budget, trainer/facilitator, time schedule, venue, participants, accommodation and transport (if necessary) and so on.

3.2.3. Confirmation

It is important to ensure whether all the arrangements that should be made at the "Plan" stage are in place or not. This confirmation process should lead to a smooth implementation of the INSET activities. The confirmation needs to be done well in advance of the INSET activities. (Two weeks before ideally) DIU is mainly in charge of carrying out the confirmation process.

Table 6 shows some important arrangements that need reconfirmation

Table 6: Procedure for Implementing the "Do" Stage

Arrangements	What to confirm
Budget	Make sure that the funds have been deposited in the accounts of District Education Office (DEO) before inviting participants. Otherwise the planned training/orientation programme would have to be postponed.
Trainers/facilitators	Confirm that trainers/facilitators will be able to come.
Training facilities/venues	Secure the training facility/venues. Confirm that suitable rooms are provided for the activities. The criteria for selecting a room for training are described at the "Plan" stage.
Participants	Notify the participants well in advance and get confirmation from them to increase attendance rate. For example, make that for the CS, HT orientation, invitation letters (Form 5) etc. are available to notify the participants.
Accommodation	Provide accommodation if the district has decided to budget it in the PP. This is not the case for non-residential INSET.
Transport	Prepare appropriate travel allowance in accordance with the district's decision. This must be budgeted for in the PP.

3.2.4. Preparation of needed materials

Before implementing the training/orientation, trainer/facilitators are supposed to prepare all the necessary items related to the training/orientation such as handouts (up to at least 1 week before the programme), stationery/items, meals and so on.

The trainer/facilitators need to prepare the following in accordance with the total number of participants who have confirmed their attendance:

1. Handouts (including Daily Evaluation Sheet, Participants' Feedback Questionnaire, etc.)
2. Related documents (attendance record, receipt for per diem, T&T etc.)
3. Stationery/items for participants, if needed
4. Stationery/items for facilitators/trainers (e.g. flipchart)
5. Snacks and meals, if needed
6. Travel allowance if needed.

The District must also ensure that other materials needed for the training such as markers, manila cards, etc. are provided for an effective workshop.

3.2.5. Implementation

Recommended contents of each training/orientation are described in the appendices of this Module.

Here, we are going to see the procedures to be followed in the general contents such as Opening Ceremony and Closing Ceremony. In addition, you can find the explanation on Completion of Evaluation Sheet and Recapitulation of Last Day's Programme, so that you can also include them in the training/orientation programme if necessary.

1) Opening Ceremony

The Opening Ceremony is common to all the training/orientation activities. You are already used to the procedure, but let's check it again as a summary. Table 4 shows the suggested steps for the Opening Ceremony. Of course, you can rearrange them to suit your local situation.

Table 7: Suggested Steps for the "Opening Ceremony"

Step 0	Registration	Before starting, the trainer/facilitator asks participants to register. If necessary, the trainer/facilitator can ask participants to give their expectations by using the Pre-Course Questionnaire.
Step 1 (5 mins)	Prayer	Trainer/facilitator invites one of the participants to pray for the success of the training/orientation.
Step 2 (5 mins)	Introduction of Chairperson and Opening Remarks	Trainer/facilitator introduces the chairperson and invites him/her to give opening remarks to the participants.
Step 3 (10 mins)	Introduction of Participants	Trainer/facilitator invites all the participants to introduce themselves briefly.

Step 4 (5 mins)	Confirmation of the objectives and agenda of training/orientation	Trainer/facilitator confirms the objectives and agenda of the training/orientation with the participants to ensure that all the items on the programme are effectively addressed.
Step 5 (5 mins)	Selection of Course Prefect (CP)	Trainer/facilitator selects a CP among the participants based on the participants' recommendation.

2) Closing Ceremony

The Closing Ceremony is another activity that is generally held at the end of INSET activities. Table 8 shows the suggested steps for the Closing Ceremony.

Table 8: Suggested Steps for the "Closing Ceremony"

Step 1 (10 mins)	Completion of Feedback Questionnaire Sheet	Trainer/facilitator gives participants Feedback Questionnaire Sheet (see page 21), and the participants fill them.
Step 2 (15 mins)	Open Forum	Trainer/facilitator asks the participants to present their questions, observations and suggestions on the whole programme. Trainer/facilitator and special guests help to address some of the concerns raised.
Step 3 (5 mins)	Closing Remarks	Trainer/facilitator invites one of the special guests to give closing remarks to the participants.
Step 3 (5 mins)	CP's Report	Trainer/facilitator invites CP to report on the whole programme.
Step 4 (3 mins)	Vote of thanks	Trainer/facilitator invites one of the participants to give the vote of thanks.
Step 4 (2 mins)	Closing prayer	Trainer/facilitator invites one of the participants to give the closing prayer.

3) Completion of Daily Evaluation Sheet

When INSET activities are conducted for several days, trainers/facilitators need to meet after each day's session to reflect on the day's activities in order to improve on the subsequent ones. Completion of Daily Evaluation Sheet (Form 6) is used to get feedback from the participants, so that the trainer/facilitators can make the necessary arrangements for the next day's programme.

At the close of each day's session, facilitators should give participants enough time to complete the sheets. This will help to review the day's activities in order to take corrective measures to improve on the programme for the subsequent days. This period can be critically used to look at the comments made by participants. Their comments should be taken into consideration in the subsequent days' sessions. They can also be used to plan other INSET programmes.

Table 9: Suggested Steps for the "Completion of Daily Evaluation Sheet"

Step 1 (10 mins)	Completion of Evaluation Sheet	Trainer/facilitator gives participants Daily Evaluation Sheets, and the participants fill them.
Step 2 (2 mins)	Closing	Trainer/facilitator closes the day's session.

4) Recapitulation of Previous Day's Programme

One of the participants will be selected as a Course Prefect (CP) to represent the group. The CP is supposed to recapitulate the previous day's programme briefly at the beginning of the next day's programme. Facilitators will also set a period for such recapitulation.

Table 10: Suggested Steps for "Recapitulation of Previous Day's Programme"

Step 1 (2 mins)	Opening	Trainer/facilitator opens the day's programme with greetings and gives the necessary instructions.
Step 2 (5 mins)	Recapitulation	Trainer/facilitator invites CP to give other participants the recapitulation of the previous day's programme.

4. Operational Manual for "See" Stage (Monitoring and Evaluation)

The "See" Stage is made up of Monitoring and Evaluation (M&E). Monitoring is an ongoing process that helps to see the progress of the programme. Evaluation is done at a particular point in time such as at the end of the year with the view to analysing /assessing the progress of the programme. As monitoring and evaluation are interrelated processes, this section does not draw a distinction between them. M&E allows all stakeholders to improve the activity/programme planning, implementation methods, and quality of results.

This section mainly explains how to manage (i.e. write and distribute) the formatted M&E sheets. As those sheets cover all the indicators for M&E, a proper management of those sheets leads to an effective M&E of the activities/programme. In addition, the process of completing those sheets helps improve activities for the following year. For example, the sheet contains questions about advantages and challenges of the activity implemented. This can provide an opportunity to analyse reasons for the advantages and deficiencies, and solutions for the deficiencies. He/She can plan the following year's training programmes with these analyses in focus.

It must be noted that the M&E of SBI/CBI are different from M&E of the training/orientations at the district level, such as HT/CL orientation, CL sourcebook training and so on. This section describes the M&E of the training/orientation programmes at the district level and the M&E of SBI/CBI respectively.

4.1. M&E Structure in the Programme

The structure of M&E in the INSET programme is not a formality and a bureaucratic procedure of reporting to authorities but a process to improve the activities. The programme has three monitoring and feedback approaches: monitoring from higher level; self-monitoring; and feedback through the sourcebook.

Monitoring from higher level is the main approach in the system. Each level should report its activities to the level above it, and monitor/give feedback to the one below it. For example, NIU monitors district activities and gives constructive feedback to the district. DIU/DTST monitors school activities and gives useful feedback to the school. The process is a top-down approach in which the higher level supports the one below it.

In addition, in the process of reporting to a higher level there is an opportunity to monitor one's own activities. This is called self-monitoring. Self-monitoring can:

- Collect more relevant and better evidence on the effectiveness and impact of their activities;
- Identify practical ways to improve their activities;
- Assess the efficiency of their activities;
- Enhance greater ownership of the programme; and
- Develop monitoring skills.

Feedback through the sourcebook is an indirect approach from the national level to the district/school level. NIU assesses the needs of districts/schools through their reports. The modified sourcebook will fully incorporate the users' needs.

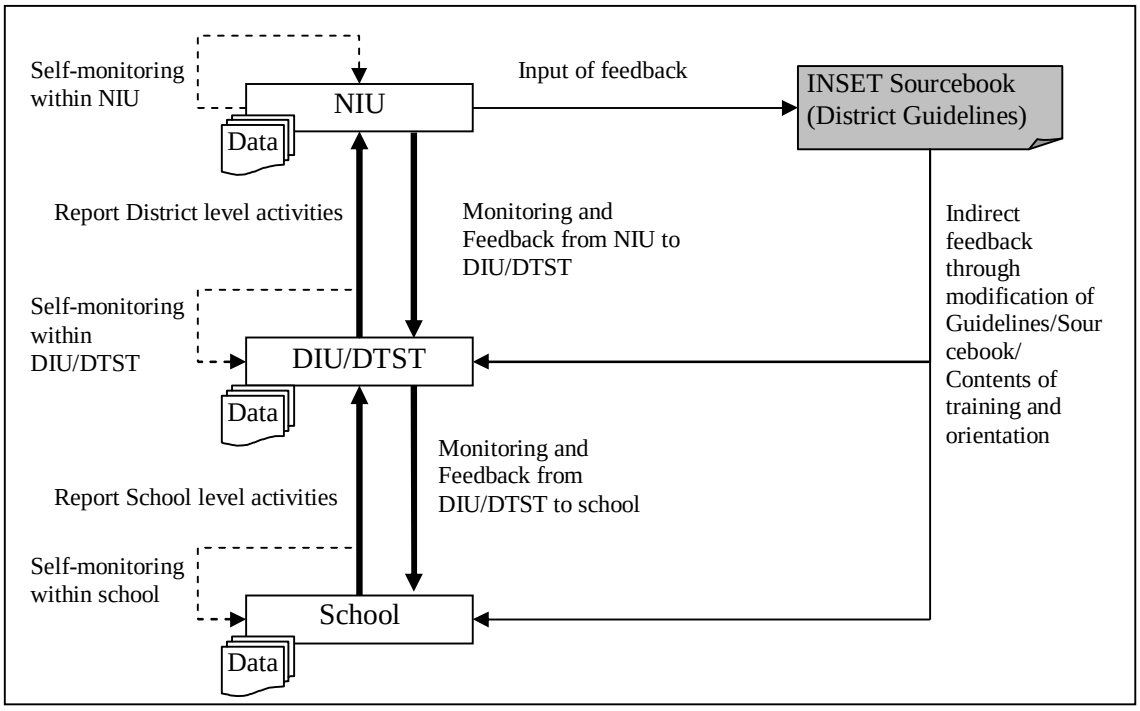


Figure 9: **M&E Structure**

This section focuses on M&E at district level, i.e. feedback to school level and self-improvement of district level.

4.2. Roles and Responsibilities

Table 11 shows the roles and responsibilities of each group for the M&E at the district level.

Table 11: Roles and Responsibilities of Key Groups for the M&E at the District Level

Group	M&E of training/orientations at district level	M&E of SBI/CBI
DIU	1) Prepare Activity Completion Sheet (ACS) a) Write ACS for the activities that DIU facilitates. b) Collect ACS (non-budget part) from DTST for activities that DTST facilitates c) Write budget part of ACS. d) Combine and finalise ACSs 2) Write APR and send it to NIU	1) Collate all feedback from school level, DTST and CS Obtain SBI Record Sheet and SBI/CBI Activity Observation Sheet from CS and store those sheets 2) Report to NIU a) Input the data from the sheets into the Monitoring Sheet in excel file which will be provided by NIU b) E-mail the file with data to NIU through the address which will be provided. If e-mail does not work, save data in a floppy disk or CD-ROM and post it.

Group	M&E of training/orientations at district level	M&E of SBI/CBI
DTST	1) Prepare ACS (non-budget Part) a) Collect Feedback Questionnaire Sheet (FQS) from participants and examine them b) Write ACS (non-budget part) including the results of Feedback Questionnaires c) Submit the ACS (non-budget part) to DIU	1) Monitor SBI/CBI and report to DIU a) Monitor SBI/CBI activities b) Write SBI/CBI Activity Observation Sheet for schools monitored and submit to DIU 2) Give Feedback to Schools a) Give schools helpful suggestions about SBI/CBI activities at post-activity discussion b) Obtain record of post-activity discussion so that DTST can present them at Information Exchange Seminar as a case study
CS	N/A	1) Help foster communication links between DEO and school a) Visit respective schools to obtain SBI Record Sheet and Summary of SBI/CBI Observation Sheet b) Submit the sheets to DIU c) Deliver feedback from schools to DIU

Note: DIU can invite NIU to monitor INSET activities at the district level, and ask them to give comments or suggestions from their monitoring.

4.3. Sheets for the M&E of training/orientations at district level

4.3.1. Summary of Required Documents

M&E of training/orientation programmes at the district level require the following M&E documents in Table 12.

Table 12: Summary of Required Documents

Documents	Its Role
Feedback Questionnaire Sheet (FQS)	This is used by participants of training/orientation programmes to evaluate activities (See Form 7)
Activity Completion Sheet (ACS) (Budget & Non-budget)	Facilitators use this sheet to report on each activity (See Form 3) to DIU
Annual Progress Report (APR)	Using this format, DIU writes a report of the annual activities at the district level. DIU needs to evaluate the annual activities well, so that they can draw up an improved Annual Implementation Plan for the following year. (See Form 4)

4.3.2. Purpose and procedure for using each document

1) Feedback Questionnaire Sheet (FQS)

Purpose

FQS is used in order to improve operation of future activities or training/orientation to reflect participants' opinions.

Procedure

1. Trainer/facilitator distributes the form at the beginning of the closing ceremony and collects them after the session.
2. Make sure that all participants have completed the sheet and submitted it before they leave the training grounds.
3. It is a good idea that facilitators ask participants to submit the sheets before they receive Per Diem (if it is to be paid).
4. Facilitators read the collected sheets carefully in order to find out how participants evaluate the activity.

Note that the collected sheets should be kept properly, so that they can be submitted to DIU afterwards, and then to the DIU together with the ACS.

2) Activity Completion Sheet (ACS)

Purpose

ACS is used in order to keep a record of implemented activities and their evaluation. The sheet has two parts: the budget and non-budget parts. The Non-budget part consists of a report about the activity implementation and a summary of questionnaires submitted by participants. The budget-part specifies the use of the budget.

Procedure

The Trainer/facilitator is requested to fill in the ACS after implementing an activity. DTST is in charge of writing it for HT/CL Orientation and CL Sourcebook Training. DIU is responsible for organising Information Exchange Seminar, Workshop and Annual Implementation Workshop.

1. When filling in the sheet, it is necessary to refer to the PP and FQS.
2. Submit the sheets within two weeks after an activity.
3. The sheets should be submitted to DIU together with FQS.
4. DIU stores the sheets for two years.

> It is significantly important to compare the implemented activity with PP (your original plan). By doing so, one can analyse which part of the planning has worked well and which part did not. These analyses should be put in the ACS.

3) Annual Progress Report (APR)

Purpose

The Annual Progress Report (APR) is used in order to monitor the progress of activities annually in the district. DIU will write the report based on the Approved AAP and ACS. The report should include:

- Progress of the activities, based on the extent to which the activities were completed in

relation to the AAP approved at the beginning of the year,
- Good points and constraints encountered, and
- Suggestions for preparing better PPs for the following year.

Procedure

1. Collect the documents related to INSET programmes in the district, such as AAP, PP and Activity Completion Sheet.
2. Compare papers at planning stage (AAP and PPs) and actual implementation report (ACS) in order to find inadequacies in the plan for the current year, and to get suggestions for planning for the following year. In comparing those documents, the following aspects are supposed to be considered;
   a) Participants: How desirable was the attendance rate of each training/orientation?
      Were any of the participants invited repeatedly?
   b) Trainers/facilitators: How effective was the distribution of resource persons?
      How effective was the facilitation of each training/orientation?
   c) Location: How appropriate was the venue for each training/orientation?
   d) Timing: How well was the time scheduled for each training/orientation?
   e) Budget: How appropriate was the budgeting?
   f) Content: How suitable/relevant was the content of each training/orientation?
3. Prepare the Report including the suggestions, so that by referring to the report, the planners can make a more appropriate plan for the following year.
4. The sheets should be submitted to NIU at the APR Seminar in July by electronic file and paper.

Make sure that the APR is prepared comparing the results with the AAP.

4.3.3. Flow of sheets for M&E of training/orientation at the district level

Figure 10 is the general procedure for M&E of training/orientations at the district level. It shows the flow of feedback sheets and reports required. These feedback sheets and reports are; 1) FQS, 2) ACS, and 3) APR. The arrows indicate the directions.

In Figure 10, Trainer/facilitator refers to those who implement activities at the district level. For instance, HT/CL orientation and CL sourcebook training are implemented by DTST. In this case, the trainer/facilitator refers to DTST members. But, Information management seminar, Annual implementation workshop and other workshops are implemented by DIU and DTST. In this case, the trainer/facilitator refers to DIU and DTST.

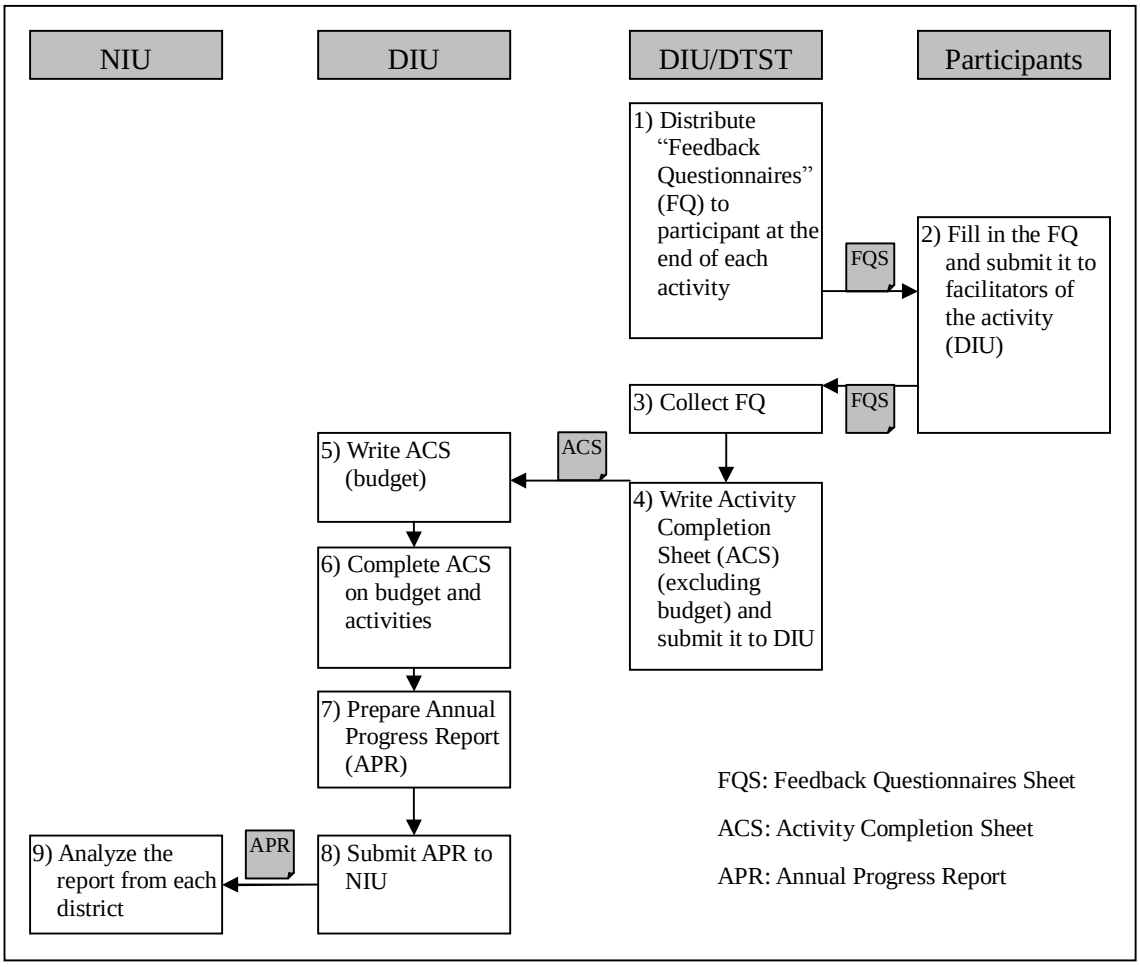


Figure 10: Flow of Sheets for M&E of Training/Orientations at the District Level

4.3.4. Submission Schedule

Table 13 shows the necessary documents for the M&E of the training/orientations at the district level with recommended schedule of submission to NIU.

Table 13: Schedule for Submitting Documents for M&E of training/orientations

Document	Person in charge	Support	Recommended submission schedule
Participants' FQS	Facilitator (DTST or DIU)	N/A	At the end of an activity
ACS (non-budget)	Facilitator (DTST or DIU)	N/A	Within two weeks after an activity
ACS (budget)	DIU	N/A	Within two weeks after an activity
Annual Progress Report (APR)	DIU	N/A	December

4.4. Sheets for the M&E of SBI/CBI

4.4.1. Summary of Required Documents

It is required that the following documents in Table 14 be used for M&E of SBI/CBI.

Table 14: Summary of required documents for M&E of SBI/CBI

Document	Its Role
SBI/CBI Activity Observation Sheet	Colleague teachers and DTST use this to evaluate SBI/CBI activities. DTST makes comments at post-activity discussion using this sheet.
SBI/CBI Implementation Summary	This consists of Questionnaire, Description of Challenges, and copy of Record on Post-Activity Discussion. This is used to monitor quality of SBI/CBI activities.
SBI/CBI Data Sheet	This is filled by HT and sent to DIU. This describes overall information about SBI/CBI implemented.
Excel file of SBI/CBI Data	This is used to collect and organise important information (quantitative) from summary of SBI/CBI data sheets.
Field Monitoring Sheet for SBI/CBI	DTST writes the result of his/her monitoring in the sheet.

4.4.2. Purpose and procedure for using each document

M&E of SBI/CBI should be done at the school level (by HT/CL/Colleague Teacher) as well as by DTST, and shared at both District and National levels. This section explains the details of SBI/CBI Activity Observation Sheet, SBI/CBI Implementation Summary, and Excel file with SBI/CBI Information, as these three files will be written by DTST/DIU. You can find detailed explanation and standardised forms for other documents in Module 3.

1) SBI/CBI Activity Observation Sheet

Purpose

The SBI/CBI activity observation sheet includes attendants' comments made during SBI/CBI activity. When DTST members observe SBI/CBI activity, they fill in this sheet. The sheet consists of columns for recording strong points and points for discussion (issues) about the implemented SBI/CBI. In the post-activity discussion, colleague teachers can use the sheets to share their opinion.

Procedure

1. In observing activity, DTST fills in the sheet.
2. DTST participates in post-activity discussion and gives comments with regard to what he/she refers to the sheets.
3. CL collects the sheets after the post-activity discussion and submits them to HT.
4. HT files the sheets and stores them.

2) SBI/CBI Implementation Summary

Purpose

The SBI/CBI implementation summary consists of questionnaires about the conduct of SBI/CBI, description of challenges, and record of post-activity discussion. DIU collects the sheets from all the schools that conducted SBI/CBI activities, and utilises them to monitor management and quality of the activity.

Procedure

1. HT writes SBI/CBI Implementation Summary after SBI/CBI activity.
2. CS collects the sheet and submits it to DIU.
3. DIU includes opinions/ suggestions raised from the sheet when planning training programme.

3) SBI/CBI Data Sheet

Purpose

This file contains basic information about SBI/CBI such as School Code and Name, Term and Year of Implementation, Type of Activity and Subject. This data sheet should be filled by the HT and submitted to DIU through CS. The DIU uses the sheet for monitoring the progress of SBI/CBI activity, e.g. how many schools have implemented SBI/CBI in a term; and what subject is likely to be used for SBI/CBI.

Procedure

1. HT prepares the sheet after conducting SBI/CBI activity, and submits it to CS.
2. CS passes the sheet to DIU.
3. DIU files the sheet, and gives feedback to schools.

4) Excel file of SBI/CBI Data

Purpose

The excel file extracts information on SBI/CBI from SBI/CBI Data Sheet. This helps NIU to manage the data of SBI/CBI implementation, as the National level does not need all the data shown in "SBI/CBI Data Sheet."

Procedure

1. The excel file will be provided by NIU.
2. After DIU obtains "SBI/CBI Data Sheet" from CS, it should input the data into the file.
3. After inputting the data, email the file to NIU. If a district has no email, burn the data

into CD or floppy disk and pass it to NIU by post or deliver it directly (when NIU visits the district).

5) Field Monitoring Sheet for SBI/CBI

Purpose

DTST uses the SBI/CBI Monitoring Sheet when monitoring SBI/CBI activities at schools. The sheet contains sections on interviewing the HT and CL about planning and improving SBI/CBI. For details, please refer to Activity 7 in Appendix 1 of this module.

Procedure

1. DTST uses the sheet while interviewing HT and CL during SBI/CBI Monitoring.
2. After each of the interviews, DTST gives feedback/advice to the HT and CL with regard to the questions asked.
3. At the Information Exchange Seminar, DTST utilises the sheets and describes the current situations concerning SBI/CBI

4.4.3. Flow of sheets for M&E of SBI/CBI

Figure 11 shows the flow of feedback sheets and reports required. The arrows indicate the directions.

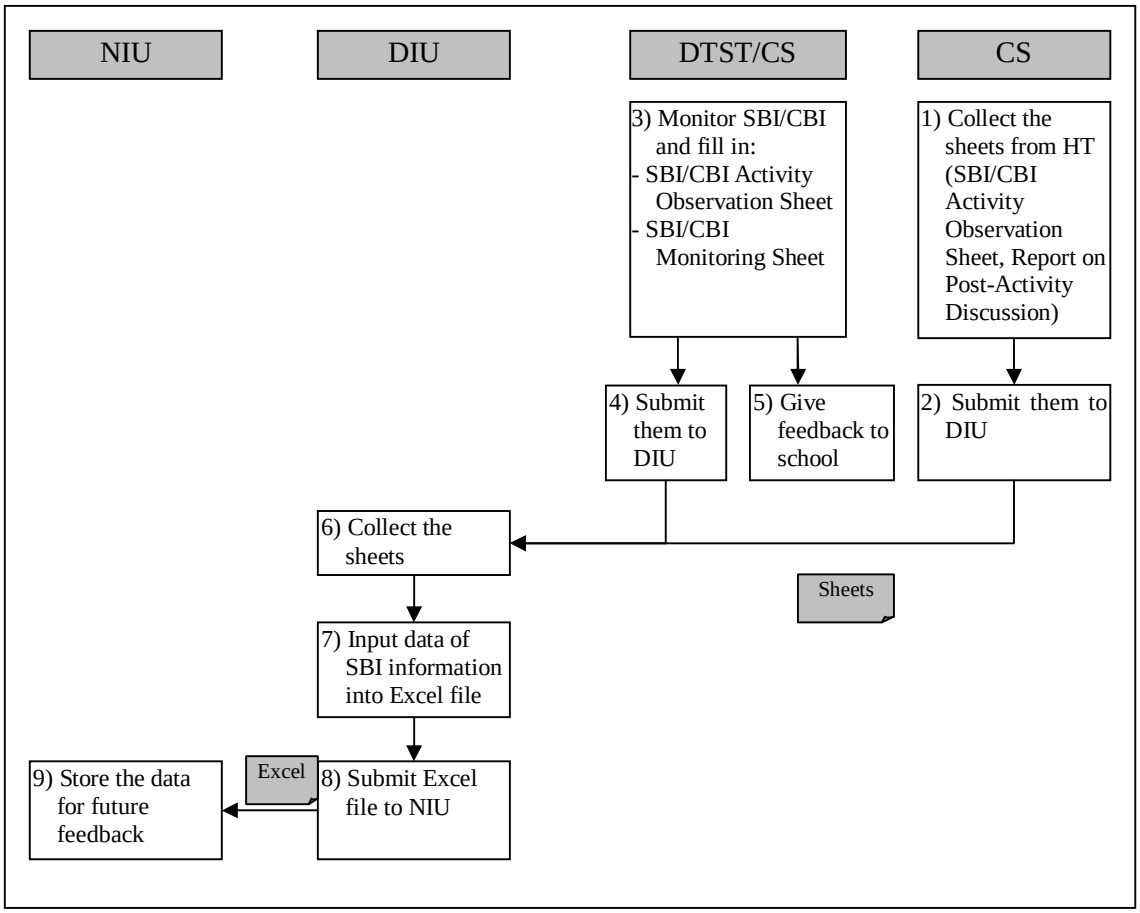


Figure 11: The flow of the Sheets for M&E of SBI/CBI

4.4.4. Submission Schedule

Table 15 shows the necessary documents for the M&E of SBI/CBI with recommended schedule of submission.

Table 15: Submission Schedule of Documents for M&E of SBI/CBI

Document	Writer	Recommended Time Frame
SBI/CBI Activity Observation Sheet	Colleague Teacher/ DTST	Just after SBI/CBI activity
SBI/CBI Implementation Summary	HT	Within two weeks after each activity
SBI/CBI Data Sheet	HT	Within two weeks after each activity
Excel file of SBI/CBI Information	DIU	End of each term
Field Monitoring Sheet for SBI/CBI	DTST	Within two weeks after DTST's school visit

5. Human Resource Management

In the INSET programme, Human Resource Management is another crucial aspect for the success of the programme. This section describes two main points, namely the selection of INSET key players and the record of the INSET key players.

5.1. Selection of the INSET key players

The DIU, DTST, Head Teacher (HT) and CL are the INSET key players at the district and school levels. DIU and HT must select DTST and CL respectively. The selections should be done before the commencement of the relevant INSET activities. For example, CLs need to be selected before CL orientation.

Figure 12 shows the lines of responsibility in the selection of the INSET key players.

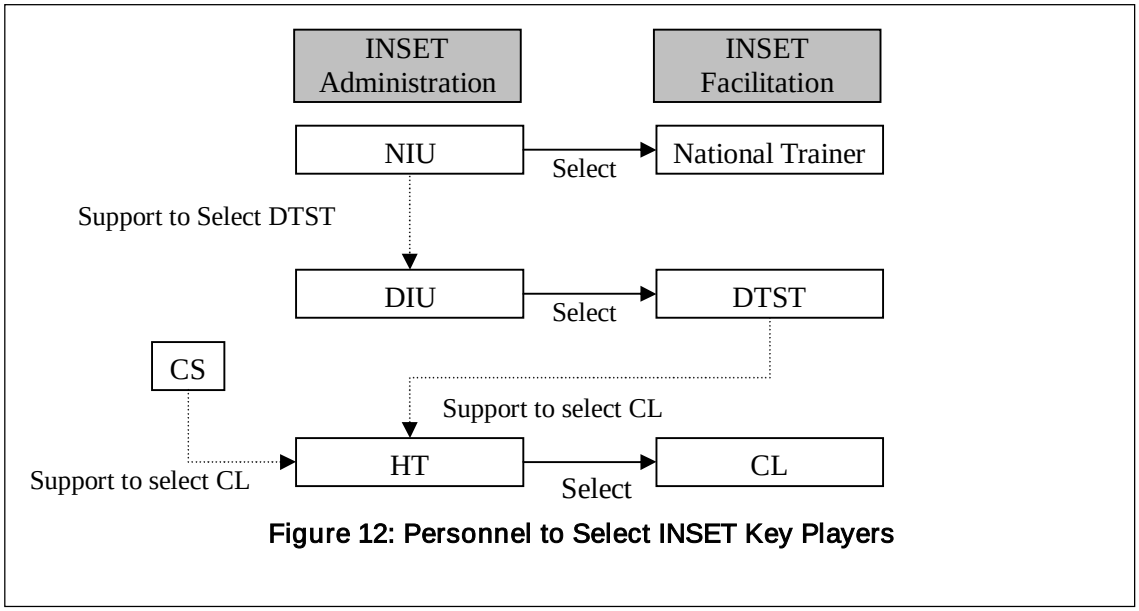


Figure 12: Personnel to Select INSET Key Players

5.1.1. Selection of DTST

1) Recommended Criteria for Selection
   - Professional and academic qualification in education
   - Preferably a first degree with specialisation in Science/Maths/English related subjects
   - Tutors in Teacher Training Colleges (TTCs), Senior Secondary Schools (SSS) and/or DEO officers with a minimum of 5 years teaching experience
   - Evidence of being abreast with current methods of teaching basic Science, Maths and other subjects
2) Recommended Composition of DTST
   - District Training Officer
   - Three persons who are/have been circuit supervisors or head teachers
   - Two persons who have English teaching experience
   - Two persons who have Science teaching experience

- Two persons who have Mathematics teaching experience

3) Method of Selection
   - Nomination by DDEs
   - Screening of Curriculum Vitae by Task Force (DDE, District Training Officer and DIU), interview, or/and recruitment

5.1.2. Selection of CL

1) Recommended Criteria for Selecting CL

Essential

- Qualified professional teachers in basic schools
- At least 3 years teaching experience in primary school
- Interest in and subject matter knowledge in Science/Mathematics

Desirable

- Evidence of INSET attendance
- Highly motivated in instructional skills
- Leadership skills
- Able to cooperate with HTs

2) Method of Selection
   - After HT selects a teacher as CL, the HT submits the CL Recommendation Form (Form 1 in Module 3) to DIU.
   - The DIU gives the form to DTST.
   - The DTST reads the form carefully and out their signature as the approval of DTST in the form if the selection is well considered. (The approval should be done before the CL participates CL orientation.)
   - If the DTST decides that the selection is unsuitable, DTST should inform the decision to the HT as soon as possible.

5.2. Record of the INSET key players

The DIU has the responsibility to keep record of all the INSET key players. Table 16 shows the types of forms that are used to keep the record.

Table 16: List of data to be managed for human resource management

Form	Section in charge	Supported by
List of DIU members (Form 10 in Appendix 2)	DIU	N/A
List of DTST members (Form 11 in Appendix 2)	DIU	DTST
Record of Orientation/Training for HT and CL (ROOT)	DIU	DTST

5.2.1. List of DIU and DTST members

The list of DIU members is used to keep the record of background information about the DIU members. The information includes position in DEO, academic background and major subject

area with experience, career history and so on.

The list of DTST members is used to keep the record of background information about the DTST members. The information includes position in their organisations, academic background and major subject area with experience, career history and so on.

Note that DIU has the responsibility to send the list of DIU and DTST members to NIU.

5.2.2. Record of Orientation/Training for HT and CL (ROOT)

It is important to keep record of the attendance at the ROOT is the record that proves which Orientation/Training HTs and CLs have already participated in. This section describes the processes of recording orientation/training activities.

1) Roles and Responsibilities

DIU

- Manage and update the "ROOT."
- Transfer ROOT to NIU termly by e-mail or post.

DTST

- Prepare and record attendance sheet for HT /CL Orientation and CL Sourcebook Training programmes.
- Report it to DIU (for updating ROOT).

2) Updating ROOT

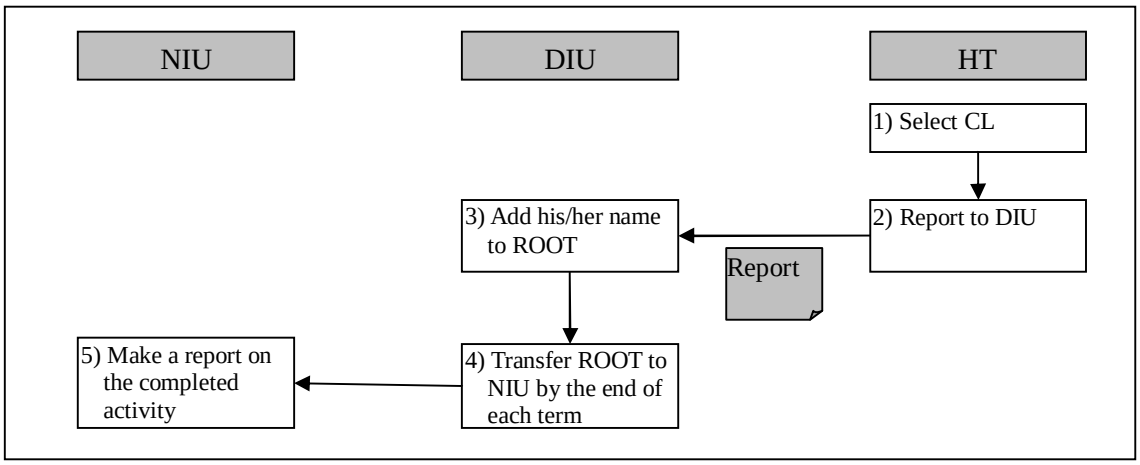
DIU should update the ROOT when the events shown in Table 17 occur.

Table 17: Opportunity to Update ROOT

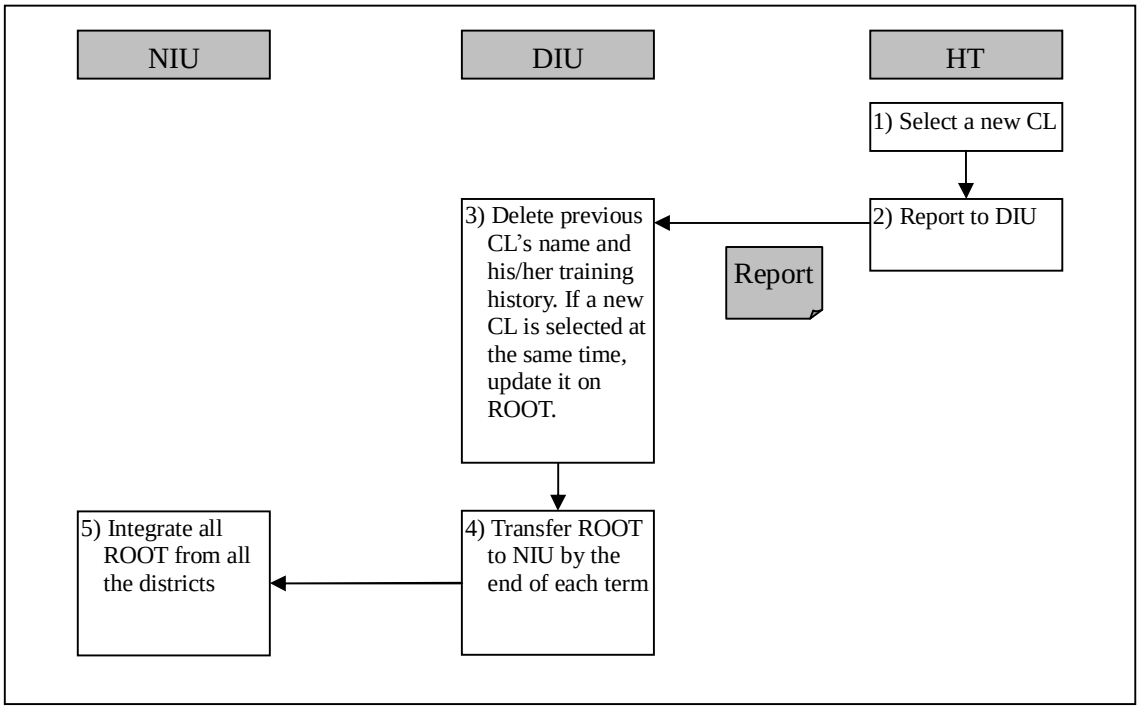
Category		DIU's Action	DTST's Action
Change in personnel	When CL is selected.	• Add CL's name on ROOT.	
	When CL leaves the school and another teacher is selected as CL.	• Delete CL's name and his/her training history. If new CL is selected at the same time, update it on ROOT.	
	When HT is replaced.	• Delete HT's name and his/her training history. • Add the name of new HT.	
Implementation of HT/CL orientation or CL training		• Add their attendance to ROOT.	• Take their attendance and submit it to DIU

The following shows the procedures of updating ROOT depending on particular events.

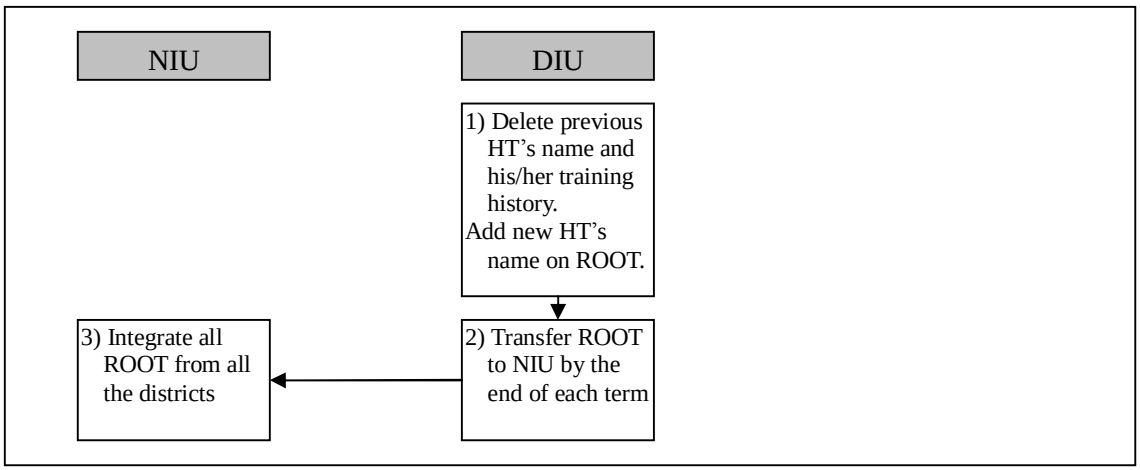
i) When CL is selected



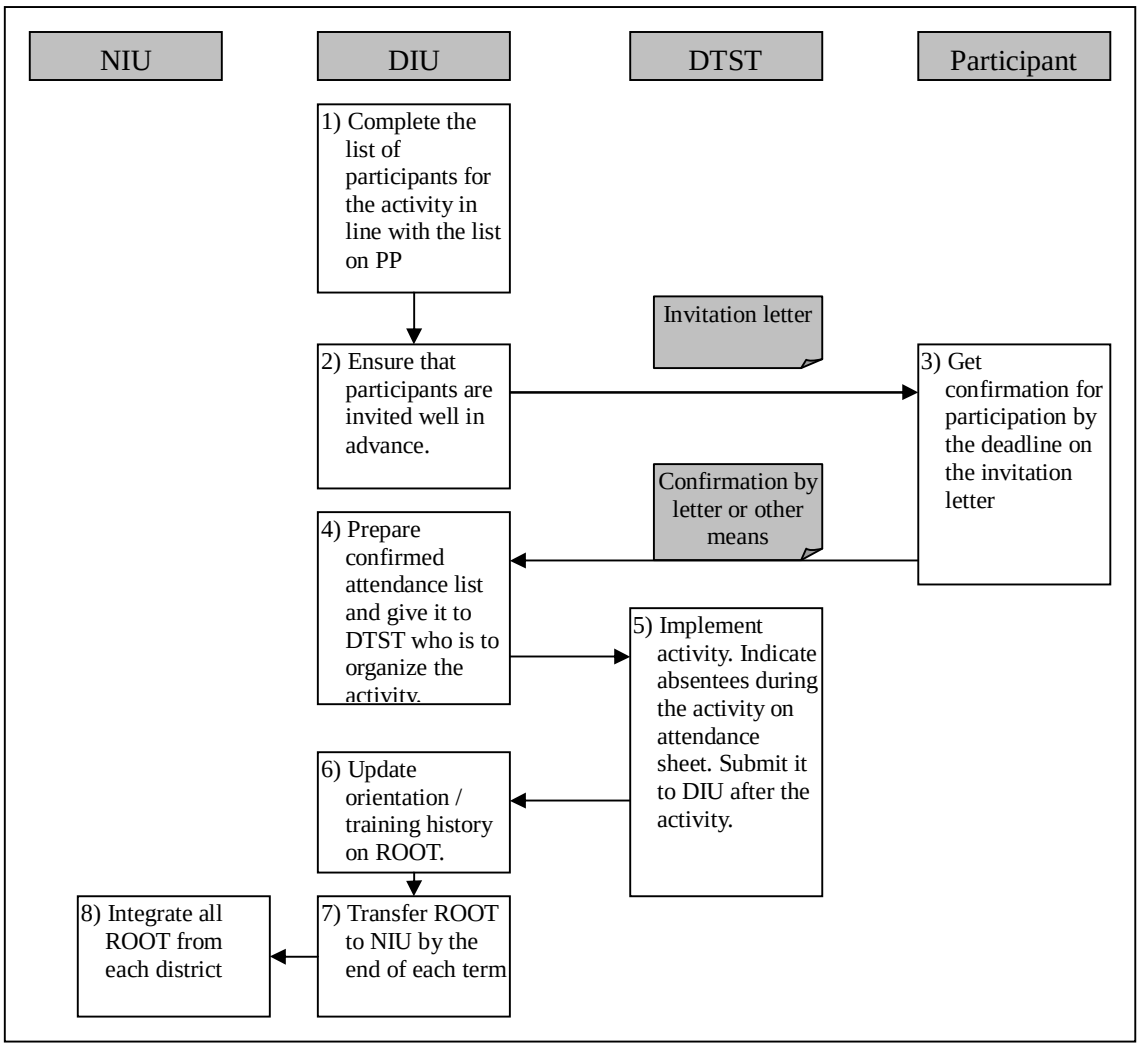
ii) When CL leaves the school and another teacher is selected as CL



iii) When HT is replaced



iv) When HT orientation, CL orientation or CL training are implemented



3) How to Record

Table 18 is an example of how to fill the ROOT form.

Table 18: How to Fill ROOT and Some Sample Data.

School		General Info		Head teacher			CL1				
Administrative code	School Name	Type	Locality	Name	Date of Ori	Remark	Name	Date of Ori	Date of SB trg (1)	Date of SB trg (2)	Remark
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
101010001	A.T.T.C. DEMONSTRATION PRIMARY & KINDERGARTEN	Public	AKROKERRI								
101010002	ABOABO II CONFIDENCE INSTITUTION COMPLEX SCHOOL	Privately Registered	ABOABO II								

1. Fill in administrative code of the school
2. Fill in school name
3. Fill in school type (private or public)
4. Fill in locality of the school
5. Fill in name of head teacher of the school
6. Fill in date the HT took the orientation
7. Put any remark about HT
8. Fill in name of CL of the school
9. Fill in the date the CL took the orientation
10. Fill in the date of the 1st Sourcebook training session for CL (5 days)
11. Fill in the date of the 2nd Sourcebook training session for CL (5 days)
12. Put any remark about HT

6. Operational Manual for Dissemination and raising public awareness

6.1. Overview of Dissemination and Public Awareness Raising

Dissemination and Public awareness raising are the processes whereby related information about SBI/CBI and INSET Programme is delivered to groups of people (chiefs, district assemblies, DEOs, NGOs, teachers and parents). The purposes of dissemination and public awareness creation are as follows:

- To ensure that key stakeholders in the community are sensitised enough to be aware of the goals and benefits of the programme
- To encourage teachers and heads of schools to do their best to achieve the goals;
- To give other stakeholders in the district a sense of involvement, commitment and confidence in the efforts of the INSET Programme.

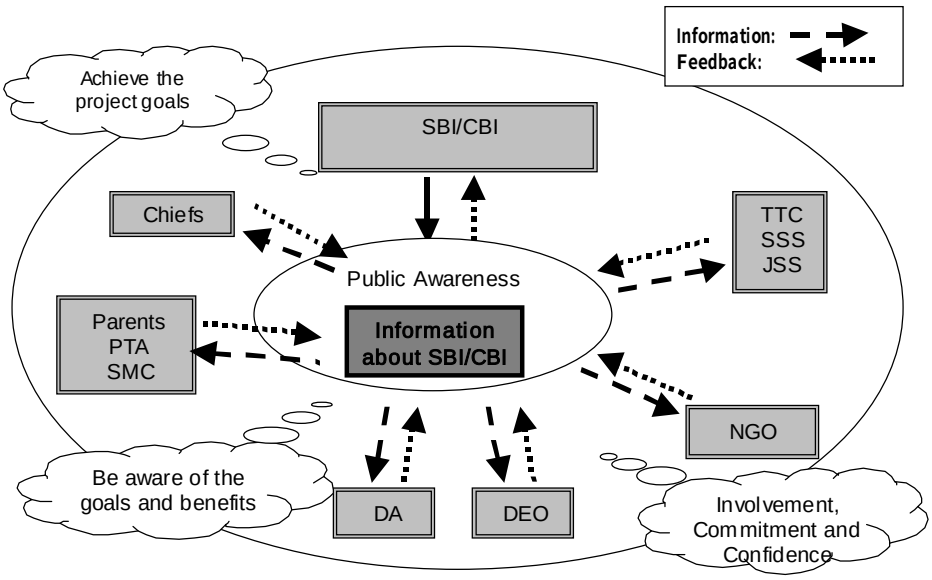


Figure 13: Purposes of Creating Awareness for Various Stakeholders

6.2. Activities for Dissemination and Public Awareness Creation

This section explains the types of activities and their operation

1) Dissemination Meeting

Before any INSET is organised in any district, dissemination meeting will be encouraged among the key district stakeholders.

Table 19: Overview of Dissemination Meeting

Organiser	DIU
Purpose	• To sensitise key stakeholders in the district about the project's plans for district level INSET • To enhance understanding about district INSET programmes • To reinforce good working relations between the schools and the communities
Duration	One Day
Expected members	Chiefs, PTAs, SMCs, TTCs, District Assemblies, NGOs, DEOs, SSS, Junior Secondary School (JSS)
Suggested Contents	• Implications on INSET Budget at the district level • Sustainability of INSET at the district level • Ownership of INSET programmes • The present situation of Science and Mathematics teaching in the schools • Collaboration with other interventions in the education sector in the districts • Exchange of ideas on general education issues in the districts
Example of Time schedule	8:30 Arrival and Registration 9:00 Opening 9:15 Outline and Present Situation of INSET Project 10:00 Break 10:30 Discussion about INSET Project – what is needed, and how to ensure its sustainability- 12:30 Closing

2) Brochure

A brochure to explain the contents of the INSET project will be distributed to DEO. The DEO can distribute them to places where information about INSET is needed, e.g. Community, Schools PTAs, District Assemblies, NGOs, etc.

3) Newsletters

Newsletters will be circulated regularly (two times a year) by the National INSET Unit. This will contain information and news about the INSET Project activities, such as events, orientation, and training. They will be sent to the DEO by post and email. DEO can contribute to the contents. The DEO can also develop its own newsletter for circulation at the district level.

4) Website

The INSET Project is going to have its own website under the MOE's website (http://ted.edughana.net/inset/). This website should include practical resources for teachers and learning materials for pupils as well as related documents for the INSET programme. The National INSET Unit will maintain and update the website, but the DIU can contribute to updating the website by sending reports and comments to NIU.

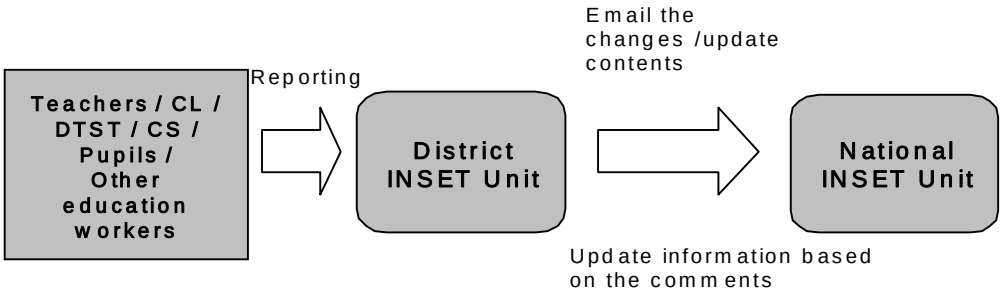


Figure 14: How to contribute to the INSET website

6.3. Other Proposed Dissemination and Public Awareness

Each district can plan its own activities to disseminate and raise public awareness, based on its local situation. The following table shows examples. Please refer to "Operational Manual for Do stage" in Section 3 of this module for information on the use of funds to implement those activities.

Table 20: Examples of Activities for Dissemination and Public Awareness Creation

Activity	Organiser	Description
Stakeholder seminars	DIU	They can share information about the successes and challenges of the district INSET programmes and strategize for improvement
PTA and SMC meetings	HT	At PTA and SMC meetings, the HT can stimulate interest in INSET Project and other general educational issues in the schools.
Giving a Speech at a local festival	DIU	Speech or discussion can be included in the programme for the local festivals. Since many local people attend festivals, public awareness creation will be effectively done.
Science and Maths Fairs and Quizzes	DIU School	They can increase interest of Science and Maths among students and the general public. More emphasis should be placed on participation than on competition among school children.
Printing of calendars	DIU	DIU can print calendars with workshop pictures at national and district levels.
Producing souvenirs (such as T-shirts and pens) for INSET	DIU	DIU can make its own souvenirs with INSET Project name printed and distribute them among stakeholders/ public.

Appendix 1: INSET Activities at the District Level

List of INSET Activities at the District Level:

Activity 1: HT Orientation

1. Introduction

The Head teacher (HT) orientation deals with administrative matters related to SBI/CBI activities such as planning, budgeting, monitoring and evaluating. It helps HT to be able to manage the administrative matters of SBI/CBI at the school level.

This appendix explains the objectives of the HT orientation, the roles and responsibilities, the content of the orientation.

It is strongly recommended that the HT orientation be organised before CL orientation and CL training are implemented.

2. Objectives of HT Orientation

The HT takes charge of the administrative matters of SBI/CBI activities such as human resource management, planning, budgeting, monitoring and evaluating. Through this orientation, HTs are expected to be able to:

- Understand INSET Model and SBI/CBI in the model and be aware of their importance.
- Select a Curriculum Leader (CL).
- Sensitise colleague teachers on the purpose of SBI/CBI and their roles in SBI/CBI.
- Include SBI/CBI into the budget of the School Performance Improvement Plan (SPIP).
- Assist CL to develop annual plan for SBI/CBI at the school level.
- Monitor and evaluate all the activities of SBI/CBI.

The HT plays a vital role in the administration of the SBI/CBI. We can say that the success of the INSET implementation depends on how well HTs are inspired, encouraged, motivated and trained to start SBI/CBI. The HT orientation is, therefore, a starting point at the school level.

3. Roles and Responsibilities

3.1. District INSET Unit (DIU)

- The DIU is in charge of carrying out the administrative matters for the orientation (such as planning, budgeting, holding the resource preparatory meeting, confirmation for the orientation).

3.2. District Teacher Support Team (DTST)

- DTST is mainly in charge of facilitating the orientation (such as preparation and implementation of the orientation).
- DTST makes presentations on SBI/CBI Overview and its Importance, Stages of SBI/CBI Organisation, Responsibilities and related tasks of HT, Annual Plan and Budget for SBI/CBI, Monitoring and Evaluation in the orientation.

– DTST facilitates discussions on the above topics in the orientation.

4. Content of HT Orientation

4.1. Programme of HT Orientation

Table 1 shows a recommended programme for the orientation:

Table 1: Suggested Programme

Time	Activity
8:30	Registration
9:00	1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) INSET Overview and Confirmation of the Objectives of the Orientation
9:30	2. SBI/CBI Overview and its Importance 1) Overview of SBI/CBI 2) Roles of key stakeholders 3) Importance of SBI/CBI
10:30	Tea break
11:00	3. Stages of SBI/CBI Organisation 1) Stages of SBI/CBI Organisation 2) Discussion on the Various Stages of SBI/CBI
12:30	4. Responsibilities and related tasks of HT 1) Difference in tasks between CL and HT 2) Selection process and how to report to DIU 3) Support for CL
13:00	Lunch
14:00	5.Annual Plan and Budget for SBI/CBI 1) Explanation of Annual Plan for SBI/CBI 2) Explanation of Budget for SBI/CBI
15:00	6. Monitoring and Evaluation 1) Information Management and Information Management System 2) Tasks of HT in the System 3) Discussion
16:00	7. Closing Ceremony 1) Evaluation Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer

Each district may have different conditions, issues, expectations and needs for INSET activities. Thus, the programme should be flexible so that DTST can fine-tune it and make it more relevant to the situation in a district.

4.2. Specific Content for This Activity

4.2.1. INSET Overview

During the open ceremony, the speaker should mention the overview of the INSET. This can be

done with the confirmation of the objective of the orientation.

4.2.2. SBI/CBI Overview and its Importance

The better the HT understands SBI/CBI models, the more likely that fruitful SBI/CBI will be conducted at the school level. The DTST is expected to explain the importance of SBI/CBI and inspire HTs.

Some of the HTs have experienced SBI/CBI in other projects/programmes, such as WSD, STM Project, etc. It is meaningful for HTs to share such experiences among themselves, so that these experiences will guide the HT in determining the needs for SBI/CBI. This activity will enable HTs to develop the sense of ownership of SBI/CBI in the INSET programme.

Resources:

→ Module 1 (District Guidelines)

→ Module 3 (Section 1: Introduction and background)

→ Performance Standards

Table 2 shows the suggested steps for SBI/CBI overview and its importance.

Table 2: Suggested Steps for SBI/CBI Overview and its Importance

Step 1 (10 mins)	SBI/CBI Overview	DTST explains the SBI/CBI model so that HTs understand the objectives and structure of SBI/CBI.
Step 2 (10 mins)	Role of key stakeholders	DTST briefly explains the roles, responsibilities and Performance Standards (PS) of each stakeholder.
Step 3 (40 mins)	Importance of SBI/CBI	DTST facilitates a discussion on the importance of SBI/CBI. HT should be encouraged to join the discussion and share their thoughts on SBI/CBI. The discussion should inspire HTs towards SBI/CBI.

4.2.3. Stages of SBI/CBI Organisation

The DTST describes all the stages of SBI/CBI organisation, using Section 1 of Module 3. The HTs should be well informed about their roles in particular stages of SBI/CBI and the forms they need to fill in. The DTST should also explain briefly how lesson demonstration and pre/post-lesson discussion are conducted in SBI/CBI.

Resources:

→ Module 3 (Section 1: Introduction and Background)

Table 3 shows the suggested steps for the process of SBI/CBI.

Table 3: Suggested Steps for the Process of SBI/CBI

Step 1 (45 mins)	Process of SBI/CBI	DTST explains the objectives and structure of SBI/CBI. The stress should be put on the process of SBI/CBI (page on 2-3 of Module 3). The roles and responsibilities of HT should be described.
Step 2 (45 mins)	Discussion on the Process of SBI/CBI	DTST facilitates a discussion on the process of SBI/CBI. The HTs should be encouraged to ask questions to clarify their understanding of the process of SBI/CBI.

4.2.4. Responsibilities and Related Tasks of HT

The CL plays a vital role in the whole activity of SBI/CBI. Therefore, the selection of CL is one of the most important tasks of the HT. Another important task of the HT is to support CL. The responsibilities and tasks of the HTs in support of CL are shown in Table 4:

Table 4: Responsibilities and Related Tasks of HT

Head Teacher (HT)	
Responsibilities	**Related Tasks**
• Maintain discipline in the CL's class when CL is on a special assignment, i.e. CL Orientation and CL Sourcebook Training.	➢ Appoint teachers to be in charge of CL's classes
• Sensitise staff to the CL training concept, its implication and the importance of SBI/CBI programme	➢ Organise meetings for CL to brief the staff after every CL training

Resources:

→ Module 2 (Section 6: Human Resource Management)

Table 5 shows the suggested steps for responsibilities and related tasks of HT.

Table 5: Suggested Steps for Responsibilities and Related Tasks of HT

Step 1 (10 mins)	Difference in tasks between CL and HT	DTST explains the tasks of CL and the difference between the tasks of CL and HT so that participants understand the concept of CL, and the roles, responsibilities and performance standards (PS) of both HT and CL.
Step 2 (10 mins)	Selection process and how to report to DIU	DTST explains the process of selecting CL and CS and their key tasks. DTST should also emphasize how important it is to report to the DIU.
Step 3 (10 mins)	Support for CL	DTST describes how HTs can support CLs, using the information of Table 3.

4.2.5. Annual Plan and Budget for SBI/CBI

Making annual plan and budget constructs the "backbone" of SBI/CBI activities. DTST needs to help HTs to make suitable annual plans and budget so that their own SBI/CBI activities are

conducted successfully. The section 2 of Module 3 (Annual Plan and Budget) is recommended as a resource for this session. Stimulating the participants to have a practical exercise is also one of the most important activities during this period. The DTST is supposed to help them understand how to use and complete the formats attached to Module 3, so that they will be able to plan for their SBI/CBI activities at school by themselves. DTST should emphasize that this system is not new at all, but it is the same as the School Performance Improvement Plan (SPIP), which participants are familiar with already so that participants will not be confused. Only one format is added to SPIP, which is the SBI/CBI Annual plan.

Resources:

→ Module 3 (Section 2: Annual Plan and Budget)

Table 6 shows the suggested steps for Annual Plan and Budget for SBI/CBI.

Table 6: Suggested Steps for Annual Plan and Budget for SBI/CBI

Step 1 (30 mins)	Explanation of Annual Plan for SBI/CBI	DTST explains what Annual Plan is and its importance, persons in charge of making Annual Plan, procedure for making Annual Plan and so on. DTST should explain that Annual Plan is almost the same as SPIP.
Step 2 (30 mins)	Explanation of Budget for SBI/CBI	DTST explains the source of funds for SBI/CBI (mainly Capitation Grants) and the procedure for applying for the funds for SBI/CBI.

4.2.6. Monitoring and Evaluation

This INSET Model has a unique feature known as "Information Management System" and the system is to capture all the relevant activities of INSET. The HT serves as a link between CL and District Education Office (DEO) to transmit information about their activities in SBI/CBI and also, the current status, issues and needs of their school and at the classroom levels. The DTST explains the Information Management System and the tasks of HTs in the system by referring to Modules 2 and 3, so that the HTs will work towards the tasks expected of them.

Resources:

→ Module 2 (Section 4: Operational Manual for "See" Stage)

→ Module 3 (Section 5: Monitoring of SBI/CBI)

Table 7 shows the suggested steps for discussing monitoring and evaluation.

Table 7: Suggested Steps for Discussing Monitoring and Evaluation

Step 1 (15 mins)	Information Management System	DTST explains the information management system and encourages participants to use the information management system.
Step 2 (30 mins)	Tasks of HT in the System	DTST explains the tasks of HT in the system so that the participants understand what they are expected to do in the system. DTST also explains the use of some forms for reporting in the system.
Step 3 (15 mins)	Discussion	DTST facilitates a discussion on the system, the tasks of HT, the report forms, and so on.

HT ORIENTATION PREPARATION CHECK LIST

Activity	Facilitator	Items/Materials
1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) Confirmation of the Objectives of the Orientation		
2. INSET Overview 1) Overview of the whole INSET structure 2) Role of key stakeholders 3) Needs Assessment		
3. Stages of SBI/CBI Organisation 1) Stages of SBI/CBI 2) Discussion on the various stages of SBI/CBI		
4. Responsibilities and related tasks of HT 1) Tasks of CL and Difference between CL and HT 2) Selection process and how to report to DIU 3) Support for CL		
5. Annual Plan and Budget for SBI/CBI 1) Explanation of Annual Plan for SBI/CBI 2) Explanation of Budget for SBI/CBI		
6. Monitoring and Evaluation 1) Information Management and Information Management System 2) Tasks of HT in the System 3) Discussion		
7. Closing Ceremony 1) Evaluation Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer		

Activity 2: CL Orientation

1. Introduction

Curriculum Leader (CL) plays a vital role in the organisation of the entire SBI/CBI activity. We can say that the success of this INSET programme depends on how well CLs are inspired, encouraged, motivated and trained for the SBI/CBI. "CL Orientation" and "CL Sourcebook Training" are quite valuable opportunities for CLs to improve their competencies of organizing and conducting SBI/CBI at the school level. It is therefore strongly recommended that these activities be implemented for CL.

CL Orientation and CL Sourcebook Training differ in their focus. Table 1 shows the focus of the orientation and the training.

Table 1: Focus of CL Orientation and CL Sourcebook Training

<table>
<tr><th>CL Orientation</th><th colspan="2">CL Sourcebook Training</th></tr>
<tr><td rowspan="3">Administration Matters for SBI/CBI</td><td colspan="2">Training Matters for SBI/CBI</td></tr>
<tr><td>First Session</td><td>Second Session</td></tr>
<tr><td>Sourcebook-based Training</td><td>Experience-based Training</td></tr>
</table>

In this appendix, we are going to see how CL orientation is planned, implemented and reflected on.

2. Objectives of CL Orientation

CL takes charge of the administrative matters for SBI/CBI activities such as planning, budgeting, monitoring and evaluating. The orientation is also to deepen understanding of the INSET Model and enhance CLs' instructional skills.

Through this orientation, CLs are expected to acquire the "Organisational and Leadership Skills (CLPS1)" indicated in the "Performance Standards for Implementers of the INSET Model (2006)" (See Table 2).

Table 2: Curriculum Leaders Performance Standards (CLPS) Specifications

Performance Standard Specification
CLPS1: Organisational and Leadership Skills
• Develop action plan for INSET delivery with input from HT and teachers
• Meet with teachers to sensitise them regarding the purpose of SBI/CBI and the role of others in SBI/CBI (e.g. CL, CS, HTs, teachers)

These above skills can be stated as follows:

- To understand INSET Model and SBI/CBI in the model
- To sensitise colleague teachers regarding the purpose of SBI/CBI and the role of others in SBI/CBI
- To support his/her HT to develop annual plan and budget for SBI/CBI at school level

3. Roles and Responsibilities

3.1. District INSET Unit (DIU)

- The DIU is in charge of carrying out the administrative matters for the orientation (such as planning, budgeting, holding the resource preparatory meeting, confirmation for the orientation).

3.2. District Teacher Support Team (DTST)

- DTST is mainly in charge of facilitating the orientation (such as preparation and implementation of the orientation).
- DTST makes presentations on INSET Overview, SBI/CBI Model, Information Management at School Level and Annual Plan and Budget for SBI/CBI in the orientation.
- DTST facilitates discussions on the above topics in the orientation.

4. Contents of CL Orientation

4.1. Programme of CL Orientation

Tables 3 and 4 show a recommended programme for the 2-day orientation. Each district may have different conditions, issues, expectations and needs for INSET activities. In such a case, the programme should be flexible to reflect those differences, so that the orientation can be made more relevant to the situation of each district.

Table 3: Suggested Programme of Day 1

Time	Activity
8:30	Registration
9:00	1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) Confirmation of the Objectives of the Orientation
9:30	2. INSET Overview 1) Overview of whole INSET structure 2) Role of key stakeholders 3) Needs Assessment
10:30	Tea break
11:00	3. SBI/CBI Model Discussion 1) Explanation of SBI/CBI 2) Discussion on SBI/CBI
12:30	Lunch
13:30	4. Information Management at School Level 1) Information Management System 2) Tasks of CL in the System 3) Discussion
15:30	5. Daily Review Meeting

Table 4: Suggested Programme of Day 2

Time	Activity
8:30	Registration
9:00	1. Recapitulation of Day 1 Programme
9:30	2. Annual Plan and Budget for SBI/CBI 1) Explanation of Annual Plan for SBI/CBI 2) Discussion on Annual Plan for SBI/CBI
10:30	Tea break
11:00	2. Annual Plan and Budget for SBI/CBI(continued) 3) Explanation of Budget for SBI/CBI 4) Discussion on Budget for SBI/CBI
12:30	Lunch
13:30	2. Annual Plan and Budget for SBI/CBI(continued) 5) Simulation for Annual Plan and Budget
15:00	3. Closing Ceremony 1) Evaluation Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer

4.2. Specific Contents for This Activity

4.2.1. INSET Overview

The better CLs learn INSET models, the more they understand the significance of SBI/CBI activities at school level. DTST is expected to give participants clear explanation about INSET in this period. DTST can use Module 1 (District Guidelines) and Module 2 (Section 5) of the sourcebook in conducting this activity.

Some of the participants have experienced INSET in other forms such as WSD, STM Project etc. It is meaningful that participants share such experiences among themselves, because these experiences will guide DTST in determining the needs for INSET. This activity enables DTST to improve the following programmes in accordance with the existing situation in schools.

Resources:

→ Module 1 (District Guidelines)

→ Module 2 (Section 5: Human Resource Management)

Suggested Steps for the INSET Overview are shown in Table 5.

Table 5: Suggested Steps for INSET Overview

Step 1 (15 mins)	Overview of whole INSET structure	DTST explains the INSET Model so that participants understand the objectives and structure of INSET.
Step 2 (15 mins)	Role of key stakeholders	DTST explains the roles, responsibilities and Performance Standards (PS) of each stakeholder.
Step 3 (15 mins)	Needs Assessment	DTST presents the current status of lessons at school level, and is expected to involve participants in discussing our challenges toward the improvement of the quality of the lessons.
Step 4 (15 mins)	Discussion on INSET	DTST leads s a discussion on the issues, merits, demerits and importance.

4.2.2. SBI/CBI Model Discussion

During this period, DTST explains SBI/CBI model. DTST needs to take note of the reactions from the participants because some of them might not have seen those activities before, and might get confused about their task, i.e. how they are expected to implement such activities in their schools.

Resources:

→ Module 3 (Section 1: Introduction and Background)

Table 6 shows suggested steps for the SBI/CBI Model Discussion.

Table 6: Suggested Steps for the SBI/CBI Model Discussion

Step 1 (50 mins)	Explanation of SBI/CBI	DTST explains the SBI/CBI Model so that participants can understand the concept of Lesson Study, the objectives and structure of SBI/CBI, the roles, responsibilities and Performance Standards (PS) of each stakeholder.
Step 2 (40 mins)	Discussion on SBI/CBI	DTST facilitates a discussion on the issues, merits and demerits, importance and difficulties, and so on.

4.2.3. Information Management at School Level

This INSET Model has a specific component known as "Information Management System", and the purpose of the system is to capture all the relevant activities of INSET.

CL is expected to give supervisors (such as HT, CS, DTST and DIU) information about the SBI/CBI activities and even the current status, issues and needs of their school and classroom levels.

DTST, therefore, needs to introduce the information management system and the tasks of CL in the system referring to Module 2 and Module 3, so that CL will work for their expected tasks properly.

Resources:

→ Module 2 (Section 5: Information Management System)

→ Module 3 (Section 5: Monitoring of SBI/CBI Activity in School)

Suggested steps for information management at school level are shown in Table 7.

Table 7: Suggested Steps for Information Management at School Level

Step 1 (30 mins)	Information Management System	DTST explains Information Management System to the participants.
Step 2 (30 mins)	Tasks of CL in the System	DTST explains the tasks of CL in the system so that the participants understand what they are expected to do in the system. DTST also explains the use of some report forms for the system.
Step 3 (30 mins)	Discussion	DTST facilitates a discussion on the system, the tasks of CL, the report forms and so on.

4.2.4. Annual Plan and Budget for SBI/CBI

DTST needs to enable participants to make feasible annual plans and budget so that their own SBI/CBI

activities will be conducted successfully. The Section 2 of Module 3 is recommended as a resource for this activity.

DTST is also supposed to help them understand how to use and complete the relevant forms attached to Module 3, so that they will plan for their SBI/CBI activities at school by themselves. The forms attached to Module 3 are as follows: SBI/CBI Annual Plan Sheet (Form 1), School Performance Improvement Plan (SPIP, Form A), Request Form (Form B), Activity Completion Report (Form H).

Resources:

→ Module 3 (Section 2: Annual Plan and Budget)

Table 8: Suggested Steps for Annual Plan and Budget for SBI/CBI

Step 1 (40 mins)	Explanation of Annual Plan for SBI/CBI	DTST explains what an Annual Plan is and its importance, persons in charge of making Annual Plans, procedure for making Annual Plans and so on. The DTST should explain that this plan is almost the same as SPIP.
Step 2 (20 mins)	Discussion on Annual Plan for SBI/CBI	Participants discuss Annual Plan for SBI/CBI, focusing on problems/difficulties in making the plan, the solutions for the problems/difficulties and so on.
Step 3 (60 mins)	Explanation of Budget for SBI/CBI	DTST explains the source of funds for the SBI/CBI (mainly Capitation Grants) and the procedure for applying for it.
Step 4 (30 mins)	Discussion on Budget for SBI/CBI	Participants discuss Budget for SBI/CBI, focusing on problems/difficulties in making the plan, the solutions for the problems/difficulties and so on.
Step 5 (90 mins)	Simulation for Annual Plan and Budget	Participants have a practice for making annual plan and budget for their own SBI/CBI having help from DTST or other participants. In this practice, the copies of SBI/CBI Annual Plan Sheet, SPIP, Request Form and Activity Completion Report should be used.

5. Procedures for Implementation of Refresher Orientation for CLs

Teachers' understanding must always keep pace with the changing trends and curriculum change. Thus, additional refresher or upgrading orientation for CLs is needed, and refresher training will be required for CLs during and after the 3rd year under the following circumstances:

- Refresher orientation for CL will be organized when there is revision of the curriculum; and
- Based on request through monitoring CLs, some CLs may be recommended to participate in refresher orientation.

CL ORIENTATION PREPARATION CHECKLIST

Activity	Facilitator	Items/Materials
1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) Confirmation of the Objectives of the Orientation		
2. INSET Overview 1) Overview of whole INSET structure 2) Role of key stakeholders 3) Needs Assessment		
3. SBI/CBI Model Discussion 1) Explanation of SBI/CBI 2) Discussion on SBI/CBI		
4. Information Management at School Level 1) Information Management System 2) Tasks of CL in the System 3) Discussion		
5. Annual Plan and Budget for SBI/CBI 1) Explanation of Annual Plan for SBI/CBI 2) Discussion on Annual Plan for SBI/CBI 3) Explanation of Budget for SBI/CBI 4) Discussion on Budget for SBI/CBI 5) Simulation for Annual Plan and Budget		
6. Closing Ceremony 1) Evaluation Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer		

Activity 3: CL Sourcebook Training

1. Introduction

The Curriculum Leader (CL) plays a vital role in the whole activity of SBI/CBI. We can say that the success of the INSET implementation depends on how well CLs are inspired, encouraged, motivated and trained for SBI/CBI. "CL Orientation" and "CL Sourcebook Training" are quite valuable opportunities for CLs to improve their abilities of organizing and conducting SBI/CBI at the school level. So it is strongly suggested that these activities be implemented for CLs.

After the 2-day CL orientation, CLs attend the **First Session** of CL Sourcebook Training. This 5-day training aims to familiarise CLs with the sourcebook modules and to prepare them for implementing SBI/CBI. Having attended the training, CLs go back to their schools and are expected to implement SBI/CBI. At the beginning of the subsequent term, CLs attend the **Second Session** of CL Sourcebook Training for another 5 days. This training aims to enhance CLs' knowledge and skills for a better implementation of SBI/CBI, based on their practical experiences of SBI/CBI. The DTST plays the main role in the implementation of the CL training while National Trainers help the DTST when necessary.

CL Orientation and CL Sourcebook Training focus on different issues. Table 1 shows what the CL Orientation and the CL Sourcebook Training focus on.

Table 1: Focuses of CL Orientation and CL Sourcebook Training

<table>
<tr><th>CL Orientation</th><th colspan="2">CL Sourcebook Training</th></tr>
<tr><td rowspan="3">Administrative Matters for SBI/CBI</td><td colspan="2">Training Matters for SBI/CBI</td></tr>
<tr><td>First Session</td><td>Second Session</td></tr>
<tr><td>Sourcebook-based Training</td><td>Experience-based Training</td></tr>
</table>

This appendix explains how the CL Sourcebook Training is planned, implemented and reflected on.

2. Objectives

Through the first and second sessions of CL Sourcebook Training, CLs are supposed to acquire the following "Organisational and Leadership Skills (CLPS1)" and "Improved Teaching Competencies (CLPS2)" indicated in the "Performance Standards for Implementers of the INSET Model (2006)". These are indicated in Table 2:

Table 2: Curriculum Leaders Performance Standards (CLPS) Specifications

Performance Standard Specification
CLPS1: Organisational and Leadership Skills
• Prepare and deliver demonstration lesson at SBI/CBI as a facilitator.

Performance Standard Specification
CLPS2: Improved Teaching Competencies

In order to improve CLs' capacity with respect to the CLPS Specification, the following objectives were formulated.

1) Objectives of the First Session (Sourcebook-Based Training)

In the first session of the training, or Sourcebook-based Training, CLs are expected to improve their capacities by:

- Carrying out one or possibly two Mathematics demonstration lesson(s) by referring to Module 5 of the Sourcebook;
- Carrying out one or possibly two Science demonstration lesson(s) by referring to Module 6 of the Sourcebook;
- Understanding the concept and the process of Lesson Study by referring Module 3 of the Sourcebook;

During actual SBI/CBI, CLs are requested to:

- Facilitate at least two SBI/CBIs in a term;
- Assist in the identification of challenging topics.

2) Objectives of the Second Session (Experience-Based Training)

In the second session of the training, or Experience-Based Training, CLs are expected to improve their competencies by:

- Sharing their experiences they have gained in SBI/CBI in their schools;
- Identifying challenging issues and good practices of SBI/CBI through discussion;
- Finding solutions to the challenging issues;
- Examining factors that have made the good practices possible;
- Sharing the challenging topics that they have brought from their own schools;
- Discussing the challenging topics with DTST with respect to teaching and learning contents and methodology;
- Finding effective ways of teaching the challenging topics with prepared lesson plans.

3. Roles and Responsibilities

3.1. District INSET Unit (DIU)

- The DIU is in charge of carrying out the administrative matters for the training (such as planning, budgeting, holding the resource preparatory meeting, confirmation for the training).

3.2. District Teacher Support Team (DTST)

- DTST is mainly in charge of facilitating the training (such as preparation and implementation of the training).
- DTST makes presentations on Background and Rationale for SBI/CBI, General Pedagogy, Teaching Contents (Subject Matter), Identification of challenging topics, Good Lesson Practices, Demonstration of SBI/CBI in the training.
- DTST encourages CLs to conduct demonstration activities.
- DTST facilitates discussions on the above topics in the training.

4. At a Glance of CL Sourcebook Training: Introduction

What is outlined below explains the relationship between the first (Sourcebook-based) and the second (Experience-based) sessions of the training.

The whole idea of the Sourcebook Training is to assist CLs to conduct effective and meaningful SBI/CBIs at their schools. The first session focuses on transferring the content discussed in the modules of the sourcebook. The second session provides a good opportunity for CLs to share their practices and ideas from their SBI/CBI experience. The aim of the second session is to help CLs to improve their knowledge and skills for the implementation of SBI/CBI based on their own and schools' needs.

Figure 1 shows the relationship between the first and second sessions.

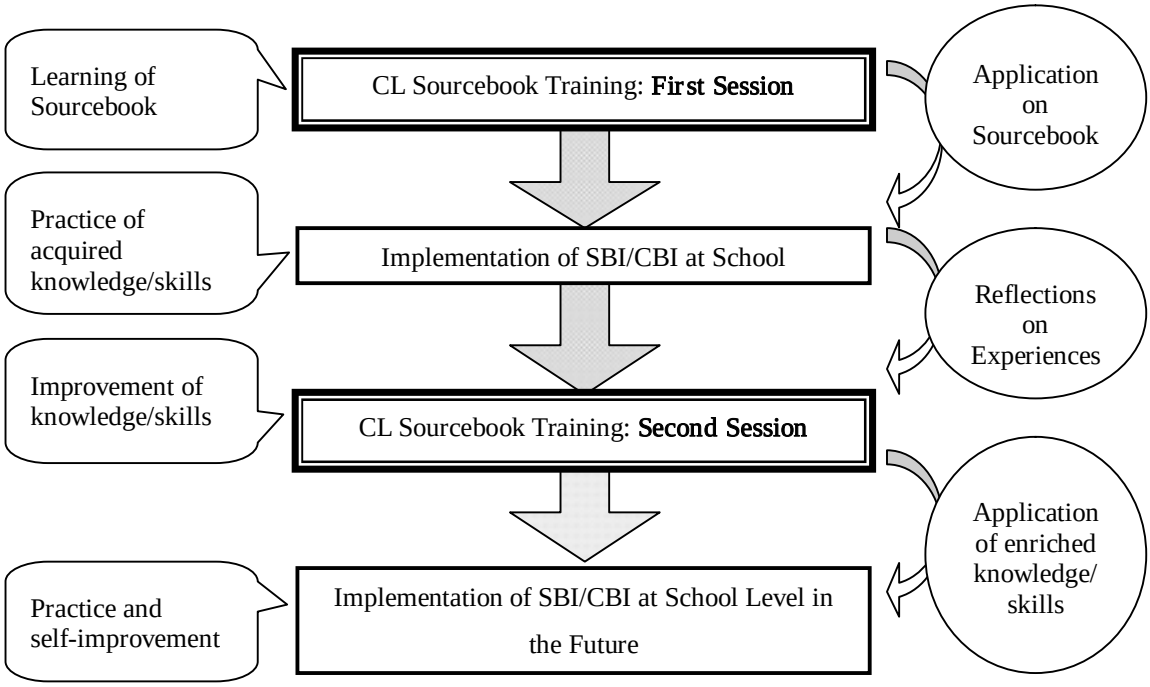


Figure 1: Relationship between the First and Second Sessions

First Session: In the first session of CL Sourcebook Training, CLs learn the contents of the Sourcebook. Having been trained, they should be sufficiently equipped with knowledge and skills to implement SBI/CBI.

At SBI/CBI: CLs apply what they have learnt in the first session to implement SBI/CBI at their own schools. CLs practice the acquired knowledge and skills in actual SBI/CBI situations. Through the implementation of SBI/CBI, CLs are expected to encounter some challenging issues and/or enjoy some success with good practices. In the mean time, CLs get practical knowledge from their own experiences.

Second Session: In the second session, CLs share with other CLs and reflect on their experiences. They come to the second session with challenging issues and/or good practices they have experienced from SBI/CBI. Through discussion with necessary assistance from DTST, CLs improve their knowledge and skills that are relevant to their concerns. By the end of the second session, CLs should be ready to go back to their schools with enriched knowledge and skills for implementation of SBI/CBI.

At Future SBI/CBI: CLs again apply what they have acquired in the second session to the implementation of SBI/CBI in their own schools. CLs keep practicing and reflecting on the acquired knowledge and skills in actual SBI/CBI situations. Although there is **No Third Session** programme, it is significantly important for a CL to continue reflecting and discussing with his/her colleagues, trying to improve SBI/CBI and their knowledge and skills.

5. Content of the First Session (Sourcebook-based)

5.1. Programme of the First Session

Table 3 shows a recommended programme for the first session of the training.

Table 3: Programme for the First Session of the CL Sourcebook Training

	Morning	Afternoon
Day 1	i) Opening Ceremony ii) Background and Rationale for SBI/CBI iii) Structure of SBI/CBI	iv) Baseline Survey Findings (Lessons) v) Experience Sharing on Lessons in your school (watching Video) vi) Daily Review Meeting
Day 2	i) Recapitulation of Day 1 Programme ii) General Pedagogy (Theory and Example of lesson plan)	iii) Teaching Contents (Subject Matter) iv) Daily Review Meeting
Day 3	i) Recapitulation of Day 2 Programme ii) Demonstration of SBI/CBI by DTST	iii) Preparation for Demonstration of SBI/CBI iv) Daily Review Meeting
Day 4	i) Recapitulation of Day 3 Programme ii) Demonstration of SBI/CBI by CL (1)	iii) Demonstration of SBI/CBI (2) and Experience Sharing on SBI/CBI iv) Daily Review Meeting
Day 5	i) Recapitulation of Day 4 Programme ii) Demonstration of SBI/CBI by CL (3)	iii) Identification of challenging topics iv) Open forum v) Closing Ceremony

Note: The programme can be changed and re-arranged depending on the particular needs of the

district. It is always important that the DTST chooses training and activities that best suit actual situations.

5.2. Day 1

5.2.1. Background and Rationale for SBI/CBI and Structure of SBI/CBI

The participants have already learnt about the INSET and SBI/CBI Models in the CL orientation. In this period, the programme will focus mainly on lesson study in SBI/CBI. As we know, lesson study is the main activity in SBI/CBI. The participants are expected to understand the importance, planning and implementation of Lesson Study at schools. Thus, the DTST has to be ready to offer detailed explanation about lesson study, referring to Module 3.

Resources:

→ Module 3 (Section 1: Introduction and Background)

5.2.2. Educational Issues in the District

The result of the Baseline Survey in 2006 has already been presented to the participants in the CL Orientation. However, in this period, the findings obtained from the lessons observed during the survey become the focus of the programme. There is the need to understand the characteristics and issues of the lessons conducted by teachers in order to improve their qualities. So the participants are supposed to learn about the findings, focusing on the lessons, and discussing and sharing actual teaching activities. If possible, it is desirable to watch videos in which a teacher is giving his/her pupils a lesson in order to enrich the discussion.

Resources:

→ The Result of the Baseline Survey (2006)

5.3. Day 2

5.3.1. General Pedagogy

Module 4 discusses various aspects of general pedagogy. The DTST is supposed to introduce the general pedagogy, considering the actual situation of lessons and focusing on some of the explanations. Of course, the DTST will select the various aspects to focus on in the first and second sessions.

Resources:

→ Module 4

5.3.2. Teaching Content (Subject Matters)

Similarly, teaching content related to subjects will be introduced by referring to Modules 5 and 6 (and more in the future) in this period. The DTST should consider the actual situation of lessons and the needs of teachers in planning and implementing lessons during this period, so that the content gets more related and adequate to meet the needs of the participants.

Resources:

→ Modules 5 and 6

5.4. Day 3

5.4.1. Demonstration of SBI/CBI by DTST

Although there are some activities that explain SBI/CBI in the training and orientation sessions, the best way to understand what SBI/CBI is really about is to see it. In this activity, DTST is requested to demonstrate a sample SBI/CBI.

It is very important to note that the way this demonstration will be performed by the DTST determines the level of motivation that CL will develop towards SBI/CBI. This is vital. The demonstration has to be practical, interesting, inspiring and enjoyable. This way, CLs will get motivated and start to implement SBI/CBI by themselves. To see this happen, the DTST needs to prepare this demonstration properly and thoroughly.

It is also effective if the DTST can arrange to conduct this demonstration (SBI/CBI) with a live class for lesson study. It means DTST demonstrates **a lesson with pupils**. To make this demonstration meaningful, the presence and reaction of pupils is crucial.

Resources:

→ Modules3, 4, 5 and 6

5.4.2. Preparation for Demonstration of SBI/CBI

Having seen the demonstration of SBI/CBI by DTST, CLs are now requested to perform their demonstration. Forming groups of 5-10, CLs prepare lessons. DTST assists them in the preparation, giving technical support. In the course of the preparation, Modules 4, 5 and 6 should provide useful information.

In addition to the lessons, CLs also need to prepare themselves to facilitate the pre-discussion and post-discussion activities. In preparation for these discussions, Module 3 should provide relevant information.

Some CLs need to play HT's roles.

Resources:

→ Modules 3, 4, 5 and 6

5.5. Day 4

5.5.1. Demonstration of SBI/CBI by CL

It is very important for CLs to actively participate in this activity. People learn much better when they do things than just listening and taking notes. By demonstrating or observing the demonstration, CLs should find it easier to master the procedure for conducting SBI/CBI.

In groups, CLs demonstrate SBI/CBI while DTST observes the implementation. A CL with the

assistance of a head teacher (role-played by a CL) facilitates pre-discussion. Then the CL demonstrates a lesson that he/she has prepared. The other CLs in the group play the role of pupils, forming the class. After the demonstration lesson, the CL with assistance from the head teacher facilitates the post-lesson discussion.

Resources:
→ Lesson plans that CL(s) prepared
→ Modules 3, 4, 5 and 6

5.5.2. Sharing Experience on Demonstration of SBI/CBI

This is the opportunity for CLs to exchange their thoughts and ideas on the demonstration of the SBI/CBI that they have conducted or observed. CLs share practical knowledge and skills for implementing effective SBI/CBI.

Resources:
→ Module 3

5.6. Day 5

5.6.1. Identification of Challenging Topics

When CLs go back to their schools, they are expected to implement SBI/CBI, putting acquired knowledge and skills into practice. Some CLs might want to use the sample lessons in the Sourcebook Modules 5 and 6, for their SBI/CBI. The sample lessons in the modules are the challenging topics that have been identified as "challenging to teach/learn" formally. These are shown to CLs for the sake of convenience. It is necessary for each CL to identify his/her own challenging topics. In addition to that, they are supposed to help their colleagues to identify their challenging topics.

Resources:
→ Modules 4, 5 and 6

6. Content of the Second Session (Experience-based)

6.1. Programme of the Second Session

Table 4 shows a recommended programme for the second session of CL Sourcebook Training.

Table 4: Programme for the Second Session of the CL Sourcebook Training

	Morning	Afternoon
Day 1	i) Opening Ceremony ii) Experience Sharing: Administrative Matters for SBI/CBI	iii) Discussion: How to overcome Administrative Issues for SBI/CBI iv) Daily Review Meeting for SBI/CBI

Day 2	i) Recapitulation of Day 1 Programme ii) Experience Sharing: Good Lesson Practices at School Level	iii) Experience Sharing: Challenging Topics at School Level iv) Daily Review Meeting
Day 3	i) Recapitulation of Day 2 Programme ii) Instruction on Challenging Topics by DTST	iii) Preparation for Demonstration of SBI/CBI on Challenging Topics iv) Daily Review Meeting
Day 4	i) Recapitulation of Day 3 Programme ii) Demonstration of SBI/CBI on Challenging Topics (1)	iii) Demonstration of SBI/CBI on Challenging Topics (2) iv) Daily Review Meeting
Day 5	i) Recapitulation of Day 4 Programme ii) Demonstration of SBI/CBI on Challenging Topics (3)	iii) Challenges to be addressed for SBI/CBI iv) Open forum v) Closing Ceremony

Note: The programme can be changed and re-arranged depending on particular needs of the district. It is always important that the DTST chooses training and activities that best suit actual situations.

6.2. Day 1

6.2.1. Experience Sharing: Administrative Matters for SBI/CBI

In this activity, CLs have a good opportunity to share and reflect on what they have experienced, good practices and challenges, during SBI/CBI implementation. The focus is supposed to be on administration. This involves planning, budgeting, coordinating, implementing, monitoring and evaluating SBI/CBI. Subject-oriented matter should not be included here since there is an activity designed for that on the following day.

Resources:

→ Module 3 (Sections 3,4 and 5)

6.2.2. Discussion: How to Overcome Administrative Issues for SBI/CBI

Having shared experiences relating to SBI/CBI administration, CLs are expected to find solutions to the challenges gathered. CLs discuss the challenges with the assistance of the DTST. More importantly, CLs can learn from one another. They are now experienced practitioners since all CLs have already implemented SBI/CBI at their schools. They have obtained some knowledge extracted from their practice of SBI/CBI and it is important to make the most of the knowledge.

Solutions should be written so that CLs can go back to their schools with the notes.

Resources:

→ Module 3 (Sections 3,4 and 5)

6.3. Day 2

6.3.1. Experience Sharing: Good Lesson Practices at School Level

This experience sharing focuses on lessons, especially good practices in lesson delivery. CLs are supposed to gather good lesson practices performed not only by CLs themselves but also their colleague teachers at schools. Lesson plans and relevant materials of the good lessons should be brought and presented. In the presentation, CLs can explain why they think the lesson practices they brought are good. Good lesson practices should be shared well and CLs are advised to take some of them back to their schools.

Resources:

→ Module 4 (Section 2: Good Primary Practices)

6.3.2. Experience Sharing: Challenging Topics at School Level

This activity is of great importance. In addition to good lesson practices, CLs are requested to come with challenging topics to the second session of the training. CLs discuss the challenging topics with the assistance of the DTST. CLs' active participation in the discussion is essential because CLs will be asked to draw up lesson plans on the challenging topics in a later activity. As mentioned in Module 2, it is important to utilise CLs' experiences and acquired knowledge from their practice of SBI/CBI. However, because these are subject-oriented challenges, the DTSTs also need to contribute their subject expertise to the discussion.

Resources:

→ Module 4

6.4. Day 3

6.4.1. Instruction on Challenging Topics by DTST

Unlike other activities in the second session, this activity requires the DTST to take a great initiative. Prior to the activity, the DTST is asked to prepare advice and information to help CLs to tackle the challenging topics. The advice and information should be both content based and pedagogy (teaching methodology) based. DTST can use lecture type approach as well as participatory approach for the delivery of the advice and information. DTST needs to equip CLs with specific knowledge and skills with respect to the challenging topics.

Resources:

→ Module 4

6.4.2. Preparation for Demonstration of SBI/CBI on Challenging Topics

In the light of DTST's instruction and their discussion, CLs are now requested to prepare their demonstration of SBI/CBI. CLs are supposed to draw up lesson plans for some challenging topics. The writing can be done individually or in groups through discussion. While DTST assists them technically, it is important for CLs to develop the lessons by themselves.

Resources:

→ Modules 3 and 4

6.5. Day 4 and Day 5

6.5.1. Demonstration of SBI/CBI on Challenging Topics

CLs demonstrate lessons using the lesson plans that they have developed. CLs should take developed lesson plans back to their schools for the sake of other colleague teachers.

Resources:

→ Lesson plans that they have drawn up

→ Module 4

6.6. Day 5

6.6.1. Challenges for SBI/CBI in the Future

CLs are expected to apply what they have acquired in the second session to the implementation of SBI/CBI at their own schools. In this activity, they can consider future challenges they might encounter with respect to SBI/CBI implementation and prepare for them. In addition to that, CLs and DTST should discuss how they could continue their learning process in SBI/CBI. Although there is **No Third Session programme**, it is significantly important for a CL to continue reflecting and discussing with his/her colleagues at their own schools. They need to keep trying to improve SBI/CBI and their knowledge and skills for a better teaching. Learning never ends.

Resources:

→ Modules 3

7. Procedures for Implementation of Refresher Training for CLs

Professional development for teachers should be a continuous process since the skills and understanding required to be a high quality teacher cannot be static. Since teachers' understanding must always keep pace with the changing trends and curriculum change, additional refresher or up-grading training for CLs will enable them to remain focused and informed about new trends. Thus, refresher training will be required for CLs during and after the 3rd year under the following circumstances:

- Refresher training for CLs will be organized when there is revision of the curriculum;
- Based on request through monitoring CLs, some CLs may be recommended to participate in refresher training.

CL SOURCEBOOK TRAINING

PREPARATION CHECK LIST

	Activity
Day 1	
	1. Opening Ceremony
	2. Experience Sharing: Administrative Matters for SBI/CBI
	3. Discussion: How to overcome Administrative Issues for SBI/CBI
Day 2	
	1. Recapitulation of Day 1 Programme
	2. Experience Sharing: Good Lesson Practices at School Level
	3.Preparation for Demonstration of SBI/CBI on Challenging Topics
Day 3	
	1. Recapitulation of Day 2 Programme
	2. Instruction on Challenging Topics by DTST
	3. Preparation for Demonstration of SBI/CBI on Challenging Topics
Day 4	
	1. Recapitulation of Day 3 Programme
	2. Demonstration of SBI/CBI on Challenging Topics (1)
	3. Demonstration of SBI/CBI on Challenging Topics (2)
Day 5	
	1. Recapitulation of Day 4 Programme
	2. Demonstration of SBI/CBI on Challenging Topics (3)
	3. Challenges to be addressed for future SBI/CBI
	4. Open forum
	5. Closing Ceremony

Activity 4: Information Exchange Seminar

1. Introduction

The sustainability of SBI/CBI activities depends on the feedback that would be obtained and used to improve the activities, since people tend to keep their interest in the activities that see continuous improvement. Information Exchange Seminar is a key activity for realizing this continuous improvement through the sharing of ideas and lessons learnt from the implemented SBI/CBIs in a district.

In this appendix, we are going to see how the seminar is planned, implemented and reflected on.

2. Objectives of Information Exchange Seminar

The overall goal of the Information Exchange Seminar is:

- To share the lessons learnt from the implemented SBI/CBIs in a district with DIU, DTST, HT and CL so that the subsequent SBI/CBIs (even other INSET activities in the district) will be improved.

To meet the above goal, the following objectives should be taken up during the seminar.

- To share progress with the implementation of SBI/CBI;
- To share good practices of SBI/CBI and their lessons learned; and
- To share feedback from Sourcebook users.

3. Roles and Responsibilities

3.1. District INSET Unit (DIU)

- DIU is in charge of the report on the progress with the implementation of SBI/CBI in Information Exchange Activity.
- DIU will keep records of the seminar outcomes. The information will be communicated to the National INSET Unit when necessary.

3.2. District Teacher Support Team (DTST)

- DTST facilitates the seminars with technical advice provided by National INSET Unit from a distance.
- DTST is in charge of reporting good practice of SBI/CBI in Information Exchange Activity.

4. Programme for Information Exchange Seminar

Table 1 shows a recommended programme for the Seminar. Each district may have different conditions, issues, expectations and needs for INSET activities. Therefore, the programme should be flexible in such cases, so that the DIU and DTST can make it more adaptable to the situation in each district.

Table 1: Suggested Programme for Information Exchange Seminar

Time	Activity
8:30	Registration
9:00	1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) Confirmation of the Objectives of the Seminar 5) Selection of Course Prefect
9:20	2. Information Exchange Activity 1) Report on the progress with the implementation of SBI/CBI 2) Report on good practices of SBI/CBI 3) Group discussion 4) Presentation of the discussion
11:50	3. Closing Ceremony 1) Feedback Questionnaire Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer

5. Information Exchange Activity

Table 2 briefly describes the suggested steps for the activity.

Table 2: Suggested Steps for Information Exchange Activity

Step 1 (15 mins)	Report on the progress with the implementation of SBI/CBI	DIU reports on the progress with the implementation of SBI/CBI within the district, based on the collected documents from all schools in the district.
Step 2 (15 mins)	Report on good practices of SBI/CBI	DTST reports on good practices of SBI/CBI implemented within the district. This report is based on the monitoring conducted by DTST and the collected documents from schools.
Step 3 (60 mins)	Group discussion	Participants form themselves in groups of between 7 and 15, and discuss problems/difficulties in conducting SBI/CBI and lessons learnt from the reports of DTST.
Step 4 (60 mins)	Presentation of the discussion	Each group presents on the result of their discussion, so that all the participants and facilitators can share the results.

Step1: Report on the progress with the implementation of SBI/CBI

DIU is supposed to report on the progress with the implementation of SBI/CBI within the district based on the **SBI/CBI Implementation Summary** and the **SBI/CBI Data Sheet** (or **Excel File**) collected from all the schools in the district. Focusing on administrative matters (such as annual plan and budget, the average number of the implementation, types of activity, subject and topics, time of the implementation attendance rate, and so on), DIU should point out strong/weak points of the implementation of SBI/CBI. In addition, it is recommended that DIU would give the participants some recommendations or suggestions for implementing the subsequent SBI/CBI.

Step2: Report on good practices of SBI/CBI

As DTST has monitored SBI/CBI activities, they are supposed to report on good practices of SBI/CBI implemented within the district based on their own monitoring (using the **Field Monitoring Sheet for SBI/CBI**). DTST can also use the **Record of Post-Activity Discussion** in the **SBI/CBI Implementation Summary** collected from all the schools. In the report, the following aspects will be focused on: Planning SBI/CBI, Implementing SBI/CBI and Improving SBI/CBI (explained in the Appendix 1 (Activity 7): Field Monitoring for SBI/CBI).

Step3: Group discussion

After the reports from DIU and DTST, the participants form themselves in groups of between 7 and 15, and discuss problems/difficulties in conducting SBI/CBI and lessons learnt from the reports given by DIU and DTST. As the participants are expected to improve their SBI/CBI implementation in the following term, the facilitators should encourage them to identify the problems/difficulties and find the lessons learnt or concrete solutions through the discussion.

Step 4: Presentation of the discussion

Each group is supposed to be invited to present on the result of their discussion, so that all the participants and facilitators can share the results. Through this presentation, it is possible that all the participants can enrich the result of their discussion, and the facilitators can also get some lessons learnt for the activities at the district level (such as CL orientation, sourcebook training and so on).

6. Post-activity Task

After the seminar, the facilitators should collect the results of the discussions and summarize them into one document. It is recommended that DTST types the results on a computer to make it easy to be given to NIU through DIU (by electronic copy). This task is important for improving the whole INSET system.

INFORMATION EXCHANGE SEMINAR PREPARATION CHECKLIST

Activity	Facilitator	Items/Materials
1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) Confirmation of the Objectives of the Seminar		
2. Information Exchange Activity 1) Report on the progress with the implementation of SBI/CBI 2) Report on good practices of SBI/CBI 3) Group discussion 4) Presentation of the discussion		
3. Closing Ceremony 1) Evaluation Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer		

Activity 5: Annual Implementation Meeting

1. Introduction

To keep the INSET programme functional, it is important to enhance understanding of District INSET programme among the stakeholders.

2. Objectives of Annual Implementation Meeting

This meeting is to confirm and disseminate timing, size and budget of each INSET activity in the district among all stakeholders in the district for the next fiscal year.

3. Roles and Responsibilities

3.1. District INSET Unit (DIU)

The DIU should be the organizer of the meeting.

DIU is supposed to send invitation letters to the Resource Persons for all the orientation/training programmes in the district (e.g. DDE, DTST, CS, District Assembly, HTs, PTA, SMC, etc.)

DTST and DIU should all agree on the date and ensure that the initial preparations are made.

4. Contents of Annual Implementation Meeting

4.1. Recommended Agenda for Discussion

Confirm the following to implement each activity smoothly.

- Schedule of each INSET activity which needs resource persons.
- Number of participants for each activity.
- Compensation.

4.2. Recommended Timing and Conditions for Implementation

This meeting should be implemented right after the Annual Action Plan has been approved, confirmed and disseminated to resource persons. Therefore, the envisaged recommended timing of this meeting is around December.

Activity 6: Examples of Workshops/Meetings

1. Introduction

This appendix shows some examples of workshops or meetings to strengthen understanding of District INSET programme among the stakeholders.

2. Objectives of Workshops

The overall goal of the workshop/meeting is to:

- Foster good relationships with other stakeholders so as to implement the INSET programme in the district smoothly.

To achieve the overall goal, it is necessary:

- To secure funding;
- To identify resource persons;
- To enhance understanding of the programme.

3. Roles and Responsibilities

3.1. District INSET Unit (DIU)

The DIU should be the organizer of all activities.

DIU is supposed to send invitation letters to the participants. The DTST and DIU should all agree on the date and ensure that the initial preparations are made.

4. Examples of Workshops / Meetings

4.1. Example 1: Annual Planning Meeting

1) Objective

- To coordinate timing, size and budget of each INSET activity in the district when DIU prepares the "Planning Paper".

2) Recommended Participants

- Organizer: DIU
- Participants: Resource Persons of each activity (e.g. DTST).

3) Recommended Agenda for Discussion

Confirm availability of resource persons for each activity. To confirm this, discuss the following.

- Schedule of each INSET activity which needs resource persons.
- Number of participants for each activity.
- Renumeration.

4) Recommended Timing and Conditions for Implementation

For the discussion of this meeting, Planning Paper for each activity for the next fiscal year is needed. Therefore, the envisaged recommended timing of this meeting is between May and June.

4.2. Example 2: Meeting to Identify Human Resource

1) Objective

- To identify resource persons in the TTC or SSS, if DEO cannot find resource persons within DEO.

2) Recommended Participants

- Organizer: DIU
- Participants: Heads of TTCs or SSS

3) Recommended Agenda for Discussion

- Present the current situation and issues regarding specific subjects (e.g. Science and Mathematics) at primary schools in the district.
- Possibility of collaborating with those in the education sector in the district.
- Issues regarding teacher training courses (Pre-service Training) and INSET.

4) Recommended Timing and Conditions for Implementation

When or if the DEO cannot identify resource persons for subject training for CLs, this meeting should however go on and discuss how to find one.

4.3. Example 3: Meeting with District Assembly to Discuss Budget

1) Objective

To make the INSET programme more sustainable, the DEO should use its own budget, as budget from other sources fluctuate every year and it is difficult to ensure their timely disbursement. The budget from the district assembly is the second-best in terms of its stability and size. So, the objective of this meeting is:

- to secure budget from district assembly, if the DEO cannot allocate funds for the programme from its own budget

2) Recommended Participants

- Organizer: DDE, DIU
- Participants: District Assembly

3) Recommended Agenda for Discussion

- Possibility of mobilising resources in the districts.

4) Recommended Timing and Conditions for its Implementation

When or if the DEO cannot secure enough funds from its own budget on ADEAP, it should consider organizing this meeting. That is, it should be organized during the budgeting process. Accounting report of the previous fiscal year would be useful to persuade the district assembly.

4.4. Example 4: Workshop for Dissemination and Fund Raising

1) Objective

The budget from the district assembly is the second-best in terms of its stability and size. However, if those funds are still not enough to implement the activities, another source of funds is needed. To make fund-raising easier, dissemination of the project is important to make stakeholders understand INSET more. The objectives of this meeting are therefore:

- To make stakeholders understand INSET more.
- To raise funds from stakeholders, if the DEO cannot fund the programme from its own budget and that of the district assembly.

2) Recommended Participants

- Organizer: DIU
- Participants: HTs, NGOs, Communities (e.g. PTA, SMC)

3) Recommended Contents for Discussion

- Present the current situation and issues regarding Science and Mathematics education at primary schools in the districts.
- Exchange information about similar teacher training programmes.
- HTs will periodically hold discussions with PTA and SMC to reinforce relations and enhance interest in INSET programmes and education in general.

4) Recommended Timing and Conditions for Implementation

When or if the DEO cannot secure enough funds from its own budget on ADEAP, it should consider organizing this meeting. That is, it should be organized during the budgeting process. Accounting report of the previous fiscal year would be useful to persuade the district assembly.

5) Sample Timetable and Sample Contents

Table 1 shows a suggested programme for the workshop. Each district may have different conditions, issues, expectations and needs for funds. Therefore, the programme should be flexible to reflect such differences, so that the DIU can make it more relevant to the situation of each district.

Table 1: Suggested Programme

Time	Activity
8:30	Registration
9:00	1. Opening Ceremony 1) Prayer 2) Opening Remarks 3) Introduction of Invited Guests and Participants 4) Confirmation of the Objectives of the Workshop

9:30	2. Education overview and INSET Overview 1) Overview of issues relating to primary education in the district 2) Overview of the INSET programme 3) Effectiveness of SBI/CBI 4) Plan of the programme implementation at the district
10:30	Tea break
11:00	3. Current situation of the programme and its funding 1) Current situation of budget 2) Discussion about fund-raising
12:30	4. Closing Ceremony 1) Evaluation Sheet Writing 2) Open Forum 3) Closing Remarks 4) Prayer

The sample contents of the programme above are as follows.

6) Education Overview and INSET Overview

The better participants understand the programme, the more interested they will be in the programme and contribute to it. As such, the DIU is expected to give participants clear explanation about the INSET programme in this period, as this is the key issue in this workshop. The DIU can use the District Guidelines, Module 2 (Section 1) of the sourcebook in conducting this activity.

Resources:
→ Module 2 (Section 1: Overview of INSET structure)

Table 2: Suggested Steps for "Education Overview and INSET Overview"

Step 1 (15 mins)	Overview of issues relating to primary education in the district	DIU explains the current situation of primary education at the district-level with regard to quality so that participants understand how important it is to improve quality.
Step 2 (15 mins)	Overview of the INSET programme	DIU explains the INSET programme briefly so that participants understand its objectives, structure and its needs.
Step 3 (15 mins)	Effectiveness of SBI/CBI	DIU explains the SBI/CBI Model so that participants understand the validity of the INSET programme to improve educational quality at the school level.
Step 4 (15 mins)	Plan of the programme implementation at the district	DIU explains Annual Action Plan of the district so that participants understand what is going on and how it will affect schools.

7) Current Situation of the Programme and its Funding

In this section, the DIU should make participants feel that the INSET programme is the best means to improve educational quality and their contributions are needed to implement the programme. To achieve this goal, it is important to show the accounting report to the participants.

Table 3: Suggested Steps for Current Situation of the Programme and its Funding

Step 1 (15 mins)	Current situation of budget	DIU explains the current situation of the budget to implement Annual Action Plan.
Step 2 (45 mins)	Discussion about fund-raising	DIU facilitates discussion on how the district can secure funds.

Activity 7: Field Monitoring for SBI/CBI

This appendix explains how the field monitoring for SBI/CBI can be carried out. The overall purposes and procedures for field monitoring are summarised in the table below.

Table 1: Overall Purposes and Procedures for Field Monitoring

Purpose	Procedure
To obtain qualitative information about current situations concerning SBI/CBI.	Interview HT and CL to obtain qualitative information about SBI/CBI.
To support schools to implement SBI/CBI more effectively and frequently.	Give necessary feedback/advice to the HT and CL with regard to the questions asked.

It is expected that DTST will find some examples of "good practice" of SBI/CBI while monitoring. DTST is requested to use the examples when reporting on good practices in the Information Exchange Seminar.

Key Aspects for Monitoring

There are mainly three key areas that the DTST needs to monitor during a school visit. These are:

- planning of SBI/CBI (Interviewing HT and CL);
- implementation of SBI/CBI (Observing and participating in SBI/CBI); and
- improvement of SBI/CBI (Interviewing HT and CL).

1) How to Monitor Planning of SBI/CBI

To monitor the planning of SBI/CBI, use the Field Monitoring Sheet for SBI/CBI, which can be found in Appendix 2 (Form 8) to keep records. It is important to consider the following points in each procedure.

Part 1: Interviewing

- Utilise time the before/after observation of SBI/CBI.
- Maintain an atmosphere that is not judgemental but supportive and cooperative.

Part 2: Advising

- Listen to the HT and CL carefully and respectfully.
- Take the challenges that emerge during the interview into consideration.
- Use experiences and comments that have been received from previous Feild SBI/CBI Monitoring that had similar challenges.
- Give feedback/advice to the school.

2) How to Monitor Implementation of SBI/CBI

To monitor the implementation of SBI/CBI, use the SBI/CBI Activity Observation Sheet, which can be found in Appendix 2 (**Form 5**) of Module 3. Hints for monitoring pre-activity discussion and post-activity discussion are as follows:

Hints for monitoring pre-activity discussion and Demonstration Activity

- Refrain from disturbing the activity by making comments in the course of the activity.
- Write down comments with regard to the aspects in SBI/CBI Activity Observation Sheet.

Hints for monitoring post-activity discussion

- When the participants (Demonstrator, Colleague Teachers and HT) are making comments, listen to their speeches carefully.
- Make comments on the activity implemented and also on the comments the participants made, in your position as a subject expert.

Notes for commenting

- Encourage the demonstrator and improve the quality of the teaching and learning.
- Provide beneficial comments not only for the demonstrator but also the colleague teachers.
- Be supportive not to hurt the feelings of the demonstrator (every teacher requires respect as a professional) or damage the cooperative atmosphere of the discussion.
- The comments should relate to the theme of the SBI/CBI.
- Be brief and concise not to dominate the discussion. (The post-discussion is not the time for DTSTs to show off their expertise.)

3) How to Monitor Improvement of SBI/CBI

To monitor the improvement of SBI/CBI, use the Field Monitoring Sheet for SBI/CBI, which can be found in Appendix 2 (**form 8**) of this module, for record keeping. It is necessary to monitor whether the school has taken actions for improving, i.e. its SBI/CBI implementation and daily practice of teaching and learning by using the lessons learnt from previous SBI/CBI. In addition, please make sure to encourage the school to initiate necessary actions for the improvement. It is important to consider the following points in each procedure.

Part 1: Interviewing

To improve SBI/CBI implementation:

- Ask for the SBI/CBI Implementation Summary (Form 6) of previous SBI/CBI.
- Check the comments that the HT has made in the sections of "Questions about Activity Administration" and "Implementation Challenges" of the form.
- Ask the HT if the school has taken any actions concerning some of the comments.
- If the HT says yes, try to identify them using appropriate ways. e.g. asking other teachers, seeing newly developed/prepared TLMs and reading-related documents and so on.
- Commend the HT and teachers involved in the actions.
- If no action has been taken, ask for reasons.
- Encourage the HT to initiate some actions and give advice that would help the HT to implement the actions.

To improve daily practice of teaching and learning:

- Ask for the Record of Post-discussion Session (Form 5) of previous SBI/CBI.
- Check the comments that the HT has made in the "Lessons Learnt for Subsequent Teaching and Learning" in the Record of Post-discussion Session of the previous SBI/CBI.

Then, follow the same steps as used for "To improve SBI/CBI implementation."

Part 2: Advising

- Commend the HT and teachers involved in the actions.
- If no action has been taken, encourage the HT to do so and give helpful advice.
- Where possible, obtain the impact of the actions taken.
- Give necessary feedback/advice to the school.

Appendix 2: Forms for INSET Programme at the District Level

List of Forms

Form 1 (1/4)

Planning Paper
Planning Paper of Activity

Serial Number (S/N)		Target Year:	
Activity Type:		Days	
Activity Name:			
Section in charge:		Person in charge:	

Details of the activity

1) Implementation Period	
2) Participant (Target Group and number)	(Break down of target is drawn on next page)
3) Facility	
3-1) Name of facility	
3-2) Capacity	
3-3) Location	
4) Resource persons	
4-1) Designated Position in INSET Organisation and number needed	
4-2) Organization to be requested	
5) Cost 5-1) Necessary Cost 5-2) Source of Funding	
6) Remarks	

Schedule

Item	Date
Deadline to apply for funding	
Expected timing of disbursement of fund	
Deadline to request resource persons	
Deadline to book a facility	
Deadline to send invitation letters to participants	
Deadline to obtain confirmation from participants	

Form 1 (2/4)

Planning Paper
Planning Paper of Activity
List of Participants (Type 1)

Activity Name: Target Year:

Cluster		School		Target	
ID	Name	ID	Name	HT	CL
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
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				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐
				☐	☐

Form 1 (3/4)

Planning Paper
Planning Paper of Activity
List of Participants (Type 2)

Activity Name: Target Year:

Cluster		Number of Participants		
ID	Name	HT	CL	Others (Specify)

Planning of Budget for Activity

For Year: Dec 2006 to Dec 2007 | Status (Circle one): (Draft, approved) | Date: 2nd Nov 2006

Activity Name: Annual Implementation Workshop

Items	Breakdown												
ACRE for facilitator / trainers / monitoring	From out of DEO	1)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		3)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
	DEO	1)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
	Consultant	1)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
	Subtotal												¢ 0
T &T for facilitator / trainers / monitoring	From out of DEO	1)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		3)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
	DEO	1)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
	Consultant	1)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢		/pers*day	x		pers	x		days	= ¢ 0
	Fuel	1)		¢		(1 day)							= ¢ 0
		2)		¢									0
	Subtotal												¢ 0
T & T for participant		1)	(Area or designation)	¢	30,000	/pers*times	x		pers	x		times	= ¢ 0
		2)	(Area or designation)	¢	30,000	/pers*times	x		pers	x		times	= ¢ 0
		3)	(Area or designation)	¢	30,000	/pers*times	x		pers	x		times	= ¢ 0
		4)	(Area or designation)	¢	30,000	/pers*times	x		pers	x		times	= ¢ 0
	Subtotal												¢ 0
Night allow. for resource person		1)	(Designation)	¢	240,000	/pers*day	x		pers	x		days	= ¢ 0
		2)	(Designation)	¢	240,000	/pers*day	x		pers	x		days	= ¢ 0
		3)	(Designation)	¢	240,000	/pers*day	x		pers	x		days	= ¢ 0
		4)	(Designation)	¢	240,000	/pers*day	x		pers	x		days	= ¢ 0
	Subtotal												¢ 0
Accom. for participant(*1)		1)	(Designation)	¢	10,000	/pers*day	x		pers	x		days	= ¢ 0
	Subtotal												¢ 0
General Cost	Printing	1)	handout			sheet/pers	x		pers	=	0	sheet	
		2)				sheet/pers	x		pers	=	0	sheet	
			Subtotal (Sheet)								0	sheet	
			Subtotal (Cost)	¢	45,000	/ream	x	0.0	ream(s)			= ¢	0
	Stationary	1)	Stationary incl. TLM, Note Pad, pen, flipchart and so on	¢	10,000	/pers*day	x		pers	x		days	= ¢ 0
		2)		¢		/unit	x		unit			= ¢	0
	Others	1)		¢		/unit	x		unit			= ¢	0
		2)		¢		/unit	x		unit			= ¢	0
	Subtotal												¢ 0
Meals		1)	Breakfast	¢		/pers*times	x		pers	x		times	= ¢ 0
		2)	Snack	¢	10,000	/pers*times	x		pers	x		times	= ¢ 0
		3)	Lunch	¢	15,000	/pers*times	x		pers	x		times	= ¢ 0
		4)	Supper	¢		/pers*times	x		pers	x		times	= ¢ 0
	Subtotal												¢ 0
Rental Fee	Venue	1)	Name of venue		School								
		2)	Fee	¢		/day	x		day			= ¢	0
	Buses(*2)			¢		/day	x		day			= ¢	0
	Subtotal												¢ 0
Others		1)		¢			x					= ¢	0
		2)		¢			x					= ¢	0
	Subtotal												¢ 0
Total													¢ 0

Fund to be appliec Counter-value fund

*1 School Premises, *2 Where necessary

Annual Action Plan

Compiled Documents:

1. Summary of Activities and Budget
2. Summary of Schedule
3. Planning Papers of all activities
    1) Planning Paper of Activity
    2) Planning of Budget for Activity

Year	
District Name	
Status	Draft / Approved
Date	

Form 2 (2/3)

Annual Action Plan
Summary of Activities and Budget

Priority	Activity	Implementing unit / personnel	Summary of inputs/items required	Expenses	FS				
						Q1	Q2	Q3	Q4

Form 2 (3/3)

Annual Action Plan
Summary of Schedule

		Title of activity	Target and number	Fund
Jan	Bgn.			
	Mid			
	End			
Feb	Bgn.			
	Mid			
	End			
Mar	Bgn.			
	Mid			
	End			
Apr	Bgn.			
	Mid			
	End			
May	Bgn.			
	Mid			
	End			
Jun	Bgn.			
	Mid			
	End			
Jul	Bgn.			
	Mid			
	End			
Aug	Bgn.			
	Mid			
	End			
Sep	Bgn.			
	Mid			
	End			
Oct	Bgn.			
	Mid			
	End			
Nov	Bgn.			
	Mid			
	End			
Dec	Bgn.			
	Mid			
	End			

ACTIVITY COMPLETION SHEET (Non-budget)

Date:

Activity Name:
Implemented Date (yy/mm/dd):

1) General Information

1. Participants

Target Group:		
Number of Participants (A):	Number of Invitees (B):	Attendance Rate (%): A/B*100

2. Trainer(s)/ Facilitator (s)

Positions of the trainer(s)/facilitator(s)
Total number:

3. Location

Name of the Facility:	Capacity:	
Has the venue changed on the Planning Paper?	Yes ☐	No ☐
If yes, does the change affect the implementation of the activity?	Yes ☐	No ☐

4. Timing

Please tick the box whether the activity was implemented as planned at the preparation stage or delayed.	Done as planned	Delayed
1) Application for funding	☐	☐
2) Request for facilitator (s)	☐	☐
3) Invitation to participants	☐	☐
4) Confirmation of participants' attendance	☐	☐

5. Other

Please describe any problems you encountered during the preparation and implementation of the activity.
Your suggestions to overcome the problems

2) Feedback from the participants

Please indicate the summary of participants' responses referring to the Participants' Feedback Questionnaires. Please calculate and write down the results of each answer in the Participants' Feedback Questionnaire. For questions that require descriptive responses, please write down the major comments.

I. Questions on the Operation

1. Location

(1) Was the location (venue) suitable and convenient?	Yes	No
Please write down the suggested locations based on the questionnaire and your opinion.		

2. Timing

(1) Was the date of the activity convenient for you?		Yes	No
Please write the suggested periods stated in the questionnaires and your opinion.			
(2) How many days/ weeks in advance were you informed to attend this activity?	More than two weeks ago	About one week ago	Less than one week ago
(3) How were you notified to attend this activity?	Letter	Verbally	Other

II. Questions on the Contents

1. Trainer(s)/ Facilitator(s)

(1) Did the trainer/facilitator help you to participate actively during the activity?	Yes	No	Not sure
(2) Please describe the strengths of trainer(s)/facilitator(s) indicated in the questionnaires and your opinion.			
(3) Please describe the challenges of the trainer(s)/facilitator(s) indicated in the questionnaires and your opinion.			

2. Programme			
(1) Was the duration of the activity adequate?	Yes	Too short	Too long
Please describe suggested duration of the activity indicated in the questionnaires and your opinion.			
(2) Was time allocation for each session adequate?		Yes	No
Please describe suggested time allocation indicated in the questionnaire and your opinion.			
(3) Was the activity practical enough?	Yes	No	I don't know
Please describe suggested activity styles indicated in the questionnaire and your opinion.			

3. Other

Please give a description of the benefits derived from the contents as indicated in the questionnaire your own opinion.
Please describe major challenges /problems of the contents raised from the questionnaire and you.
Please write down suggestions to address the challenges /problems raised by the participants.

Prepared by _____ Title_____

Form 3 (4/4)

ACTIVITY COMPLETION SHEET (Budget)

Activity Name:
Implemented Date (yy/mm/dd):

1. Budget in comparison with the Planning Paper

Item	Planned Budget (cedis)	Actual Budget (cedis)	Difference (cedis)
Reward for facilitators/ trainers			
Travel Expenses for facilitators / trainers			
Travel expenses for participants			
General Cost			
Postage Fee			
Rental Fee			
Other expenses			
Total			

2. Source (s) of Funding

Original	
Actual	

3. Timing of the release of funds

Was the timing for the release of funds appropriate?	Yes ☐	No ☐
If no, what were the reasons?		

Note: The sheet should be prepared by NIU.

Form 4 (1/3)

Annual Progress Report

1. Activities and their budget report (comparing to Annual Action Plan)

Activity Name	Implementation Date	Source of funding	Approved budget	Actual Expenses	Number of participants / expected participants

Form 4 (2/3)

Annual Progress Report

2. Summary of the Activities

		Activity Name	Main Participants
Jan	Bgn.		
	Mid		
	End		
Feb	Bgn.		
	Mid		
	End		
Mar	Bgn.		
	Mid		
	End		
Apr	Bgn.		
	Mid		
	End		
May	Bgn.		
	Mid		
	End		
Jun	Bgn.		
	Mid		
	End		
Jul	Bgn.		
	Mid		
	End		
Aug	Bgn.		
	Mid		
	End		
Sep	Bgn.		
	Mid		
	End		
Oct	Bgn.		
	Mid		
	End		
Nov	Bgn.		
	Mid		
	End		
Dec	Bgn.		
	Mid		
	End		

3. Recommendations

Please write down any good points and challenges of this year's activities from the comments in the Activity Completion Sheets. Then make suggestions to improve future activities. Please ensure that information on the following aspects is included in the contents: Participants; Trainers/facilitators; Location; Timing; and Budget.

Good Points of the activities

Constraints Encountered

Suggestions to the next year's activities

Form 5 (1/2)

GHANA EDUCATION SERVICE

In case of reply the number and date of this letter should be quoted

My Ref. No. GES/TED/INSET/06/
Your Ref. No.

District Education Office
Ghana Education Service
P.O. Box Your postal address
Your Address
Date

Dear Head Teachers

Re: Invitation Letter – Head Teacher Orientation for INSET Programme

The Ghana Education Service (GES) is implementing a programme to support the institutionalisation of INSET at the primary level in Ghana. This programme focuses on School Based INSET and our district is selected as a pilot district.

As part of this programme, a 1-day orientation for Head Teachers will be organised. You are by this letter being invited to the orientation. The details of the Workshop are as follows.

Venue: District Education Office at

Date: Thursday 12th December

Time: 9:30 am prompt. (Whole day)

To ensure the smooth implementation of the progamme, you are to give a written confirmation of attendance by 31st November using the questionnaire attached (use the attached form).Thank you very much for your cooperation.

Yours faithfully,

(The name of DDE)

DISTRICT DIRECTOR OF EDUCATION (DISTRICT EDUCATION OFFICE)

Form 5 (2/2)

Notification of Attendance

Training name	
Date	
Attendance (Circle one)	Attend / Not attend
Administrative ID	
Name of School	
Name of Head teacher	

Signature

Date

Note: Please send this to DEO or pass it to Circuit Supervisor.

Form 6

DAILY EVALUATION SHEET

Programme: .....

Participant: ..... Date: ..... (Day)

School: ..... District: .....

Write your comments on each of today's activities (topic of the activity and the time) in the spaces provided.

Activity 1: Time: –   Comments: ....
Activity 2: Time: –   Comments: ....
Activity 3: Time: –   Comments: ....

Form 7

Feedback Questionnaire Sheet

Activity Name:	Implemented Date (yy/mm/dd):

Please evaluate the activity based on your opinion.

I. Questions on the Operation

1. Location

(1) Was the location (venue) suitable and convenient?	Yes ☐	No ☐
If no, please suggest a better location.		

2. Timing

(1) Was the date of the activity convenient for you?	Yes ☐	No ☐
If you tick no, please indicate which period will be more convenient for the activity.		
(2) How many days / weeks in advance were you informed to attend this activity?	More than two weeks ago ☐	About one week ago ☐	Less than one week ago ☐
(3) How were you notified to attend this activity?	Letter ☐	Verbally ☐	Other ☐

II. Questions on the Contents

1. Trainer(s)/ Facilitator(s)

(1) Did the trainer/facilitator help you to participate actively during the activity?	Yes ☐	No ☐	I don't know ☐
(2) Please describe the trainer(s)/facilitators' strengths.			
(3) Please describe the challenges of the trainer(s)/facilitator(s).			

2. Programme

(1) Was the duration of the activity adequate?	Yes ☐	Too short ☐	Too long ☐
If you tick "too short" or "too long", please suggest a better duration.			
(2) Was time allocation for each session adequate?		Yes ☐	No ☐
If no, please describe your suggestion.			
(3) Was the activity practical enough?	Yes ☐	No ☐	I don't know ☐

3. Other

(1) Please describe in what(s) the contents were beneficial to you.
(2) Please describe the challenges / problems of the contents.

Thank you for your cooperation.

Form 8 (1/2)

Field Monitoring Sheet for SBI/CBI

School: ..... Date: ..... Time: ..... –

Demonstrator: .....

Type of the Activity: Demonstration Lesson Peer Teaching TLM Preparation/usage

Class: ..... Subject: .....

Topic/Sub-topic: .....

Objectives of the Activity: .....

Please fill in the result of interview with headteacher/ CL using the questions provided.

Planning of SBI/CBI

1. Needs Assessment

How were the challenging topics for SBI/CBI decided?		
Did colleague teachers get involved in the decision making process?	Yes ☐	No ☐
If yes, please describe how they were involved. If no, please explain the reasons.		

2. Annual Plan

Please give reasons for selecting the type of the activity.

3.Preparation

How were the demonstrators were decided on?		
Which Modules were used in preparing demonstration activities?		
Module 4 ☐	Module 5 ☐	Module 6 ☐

Implementation of SBI/CBI

1. Pre-activity Discussion

Theme of the activity		
Did CL give clear instructions to colleague teachers about the activity?	Yes ☐	No ☐

Improvement of SBI/CBI

1. Improvement of SBI/CBI implementation

Did HT take any actions to the comments raised in the previous SBI/CBI Implementation Summary?	Yes ☐	No ☐
If yes, please identify them. If no, please write down the reasons.		
What were the impacts of the action taken?		

2. Improvement of Daily practice of teaching and learning

Did HT take any actions to the comments in the "Lessons Learnt for Subsequent Teaching and Learning" in the previous Records of Post-Discussion Session?	Yes ☐	No ☐
If yes, please identify them. If no, please write down the reasons.		
What were the impacts of the action taken?		

Form 9

Record of Orientation and Training at school level

Last Updated: dd/mm/yy

School Name		Administrative code	

1. General

Region	Code		Name	
District	Code		Name	
Cluster	Code		Name	

2. Personnel in school

	Name	Persons who assisted in the selection
HT		N/A
CL		

3. History of Orientation / Training

Head teacher Orientation

Date attended	
Remark	

CL Orientation

Date attended	
Remark	

CL Sourcebook Training (1)

Date attended	
Remark	

CL Sourcebook Training (2)

Date attended	
Remark	

Form 10

List of District INSET Unit (DIU) Members

Region		District		Last updated	

S/N	Name	Position in DEO	Academic background and major subject	Career history	Date assigned
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Note: Give highlight for those who assigned newly

Form 11

List of District Teacher Support Team (DTST) Members

Region		District		Last updated	

S/N	Name	Position in their organization	Academic background and major subject	Career history	Date assigned
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

Note: Give highlight for those who have been newly assigned.

Module 3: School-Based and Cluster-Based INSET (SBI/CBI) Manual

Users:

Head Teachers (HT)

Curriculum Leaders (CL)

Teachers

District Teacher Support Team (DTST)

Objectives of this Module:

This module is to explain the School-Based and Cluster-Based INSETs (SBI/CBI). In this module, the users can see the importance and objectives of SBI/CBI, roles and responsibilities of the stakeholders, the concept of Lesson Study which is the key activity of SBI/CBI, the procedures in planning, preparing, implementing, and monitoring SBI/CBI meetings. In this way, SBI/CBI can be successfully conducted at each school and cluster level. Through productive SBI/CBI meetings, the quality of teachers, lessons and finally, the country's education delivery is expected to improve.

Table of Contents:

Version:	1.00

1. Introduction and Background

1.1. Introduction to School-Based INSET (SBI) and Cluster-Based INSET (CBI)

Most certainly, teachers are the main people who can identify the problems that affect the quality of lessons. It is also certain that classrooms are the places where we can find such problems and the ways to improve the quality of lessons. It is impossible to talk about the quality of lessons without talking about teachers and classrooms. SBI and CBI take place in classrooms where theoretical teaching/learning activities are put into practice.

During SBI/CBI, all the three activities, namely Demonstration Lesson, Peer Teaching and TLM Preparation/Usage, aim at improving the quality of teachers through ensuring "Continuous Professional Development (CPD, see page 10)" for individual teachers and establishing "Collegiality (see page 11)" for a group of teachers.

1.1.1. SBI and CBI

SBI is an INSET which literaly takes place at a school, using the school as a venue and the teachers as resource persons. Because SBI involves only the teachers in the school, it does not require much expenditure. For instance, SBI does not incur transport and accommodation costs. Thus, in terms of sustainability of INSET, SBI is an ideal way and should be preferred.

But, in some areas in Ghana, especially in the remote areas, there are many small size schools. The number of the staff members in those schools can be too small to establish a meaningful SBI. In that case, schools nearby can form a cluster to implement Cluster-Based INSET (CBI) instead. For example, three neighbouring schools can form a cluster and select a school as a host. The number of teachers in the three schools should be a good number to constitute a CBI at the host school. Teachers from different schools are expected to bring different ideas to enhance CBI operation. It should enrich INSET activities. Moving teachers for CBI meetings might make CBI more costly than SBI. This should be minimised if schools for the cluster are carefully chosen to reduce long distance travel.

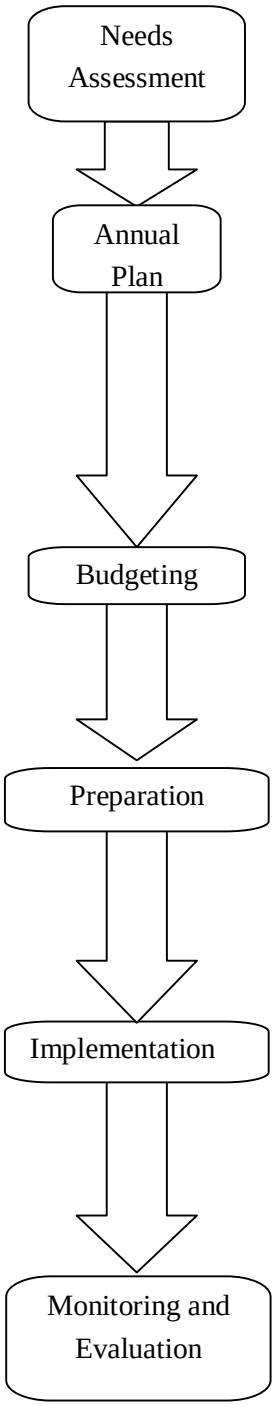
However, CBI has the meaningful benefit that the participants can share their teaching experiences and ideas, and encourage to improve their own daily teaching activities each other across the boundary of schools.

Some tips for CBI are as follows:

- Hosting should be done in turns.
- The number of schools for a CBI should be kept reasonably small (to reduce travel expense and time).
- Invited schools (not host) should contribute in cash or kind towards the CBI programme.

1.1.2. A glance at SBI/CBI Process

The whole SBI/CBI process is briefly presented here in order to give a general picture of its activities.



Challenging Topics can be identified through Needs Assessment.

See chapter 6: Challenging Topics (page 32 of this module) for further information about Challenging Topics.

CL and HT will plan their SBI/CBI at the beginning of the academic year.

See chapter 2: Annual Plan and Budget (page 16 of this module).

CL and HT need to decide on which SBI/CBI activities (Demonstration Lesson, Peer Teaching or TLM Preparation/usage), they will use.

See 1.3. SBI/CBI Activity (page 6 of this module) for relevant information.

Capitation Grants is highlighted as a source of funding.

See chapter 2: Annual Plan and Budget (page 16 of this module) for relevant information.

With HT and other colleague teachers, CL is supposed to arrange the preparatory session for SBI/CBI.

See chapter 3: Preparation of SBI/CBI (page 20 of this module) for relevant information.

CL facilitates pre- and post-activity discussions while a previously appointed teacher demonstrates a lesson or a TLM preparation/usage.

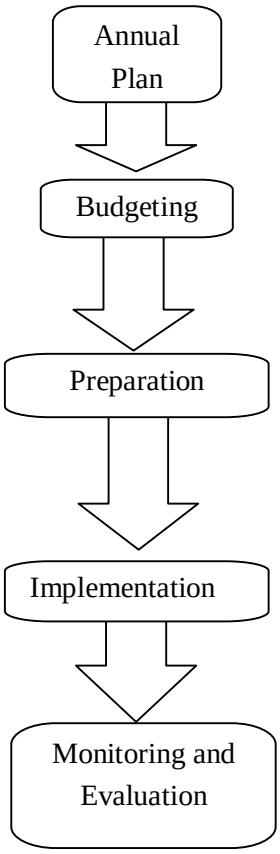
See chapter 4: Implementation of SBI/CBI (page 25 of this module) for relevant information.

HT and CL keep records on the SBI/CBI activities conducted and submit them to DEO. CS can also collect the records and submit them to DEO.

See chapter 5: Monitoring of SBI/CBI (page 29 of this module) for relevant information.

1.1.3. A glance at SBI/CBI Process with Required Forms

The diagram below shows the SBI/CBI process and required forms for each stage. For further information about filling in the forms, read the designated sections.



SBI/CBI Annual Plan Sheet (Form 2)

See chapter 2: Annual Plan and Budget.

School Performance Improvement Plans (Form A)

See chapter 2: Annual Plan and Budget.

SBI/CBI Session Planning Sheet (Form 3) and SBI/CBI Demonstration Activity Format (Form 4)

See chapter 3: Preparation of SBI/CBI.

Activity Observation Sheet (Form 5)

See chapter 4: Implementation of SBI/CBI.

Record of Post-Activity Discussion Session (Form 6) and SBI/CBI Implementation Summary (Form 7).

See chapter 5: Monitoring of SBI/CBI.

Table 1 indicates the person in charge of writing and collecting each form.

Table 1: Forms and Person in Charge

	Form 2	Form 3	Form 4	Form 5	Form 6	Form 7
Who to write	CL	CL	Demonstrator	Teachers	HT	HT
Who to collect	HT	HT	CL	HT	CS	CS

1.2. Objectives of SBI/CBI

SBI/CBI is supposed to aim at improving the quality of teachers, that is, ensuring "Continuous Professional Development (CPD)" for individual teachers and establishing "Collegiality" for a group of teachers. The objectives of SBI/CBI can be understood from the explanation below:

For each teacher as an "Individual"

To improve on each teacher's competencies (knowledge, skills and attitude) in the following:

- Instructional planning skills,
- Teaching methodology and delivery,
- Classroom organization and management.

For teachers as a "Group"

- To encourage collaboration and cooperation among teachers,

- To inspire teachers to engage in collaborative activities to improve on the quality of their lessons in their daily teaching,
- To establish "Collegiality" among teachers.

In this INSET programme, the concept of "Lesson Study (see page 12)" is to be introduced as the core activity of SBI/CBI in order to realize the objectives above.

1.3. SBI/CBI Activity

To prepare SBI/CBI, it is necessary to have a clear idea of the activities that will be used in the programme.

It is up to the school to decide on which types of activities they want to use for SBI/CBI, but in this module three types of demonstration activities are presented. They are Demonstration Lesson, Peer Teaching and TLM Preparation/usage. These activities are recommended because they were found to be effective in previous SBI/CBI programmes in Ghana. Table 2 shows the three activities and their main features and advantages.

Table 2: SBI/CBI Activity with their Main Features and Advantages

Type of Activity	Demonstration Lesson	Peer Teaching	TLM Preparation/usage
Main features	Facilitating a lesson with a live class (with pupils)	Facilitating a lesson with colleague teachers (without pupils)	Demonstrating the preparation/usage of TLM without pupils
Advantages	Ability to see pupils' reaction, level of understanding and way of thinking	Teachers can learn better from their colleague teachers.	Ability to concentrate on TLM and try something new without disturbing pupils.

Note: See the latter part of Lesson Study (See page 12).

Demonstration lesson and peer teaching are almost the same. However, a demonstration lesson takes place with a 'live' class, meaning a demonstrator teaches a lesson to real pupils. On the contrary, peer teaching does not involve pupils, rather a demonstrator conducts a lesson using his/her colleague teachers as pupils.

TLM preparation/usage is another option and it focuses on TLM rather than a whole lesson. A demonstrator can show how to construct a TLM using locally available resources. It is equally important to consider how TLM can be used in the development of a lesson in order for pupils to understand what they should learn in the lesson. It will be pointless to use a TLM if it is not directly related to the lesson objectives.

1.3.1. Three stages of SBI/CBI activity

All the SBI/CBI activities follow the same stages of Pre-activity Discussion, Demonstration Activity and Post-activity Discussion.

1) Pre-activity Discussion

In the pre-activity stage, CL gives instruction to participants. The instruction includes a short discussion on themes based on the activity. The themes should help participants to focus on which aspects of the activity they are going to observe. Participants fill in portions of the Activity Observation Sheet (name, date, subject to be observed, etc) during this stage and complete the rest of the information as they observe the lesson in the next stage.

2) Demonstration Activity

In the activity stage, participants implement a planned activity. For example, if they decide on a demonstration lesson for their SBI/CBI, a demonstrator will conduct a lesson and the other participating teachers will observe it. This is the same for peer teaching except for the fact that there will be no pupils in the peer teaching demonstration. In peer teaching, participating teachers play the role of pupils instead. Participants who have chosen TLM preparation/usage for their SBI/CBI activity will demonstrate preparation and usage of a TLM.

3) Post-activity Discussion

In the post-activity stage, participants will evaluate (see) the implementation of the activity and assess the extent of improvement. The participants are also expected to improve on their own daily teaching activities based on the evaluation they have done in the post-activity discussion.

1.4. Roles and Responsibilities

1.4.1. Head teacher (HT)

HTs are directly responsible for managing their staff to effectively deliver lessons in all subjects at the basic school level. Thus, the skills they require most are teacher and school management skills.

HTs are also expected to appraise their staff and provide opportunities for them to improve their professional practice through SBI/CBI. In addition to this, HTs are to monitor and evaluate the performance of teachers as a way of helping them to identify their strengths and weaknesses.

In the SBI/CBI model, CL work under the leadership of HTs to deliver SBI/CBI.

Table 3: INSET Responsibilities of the HT

Head Teacher (HT)	
INSET Responsibilities	**Related INSET Tasks**
• Select CL.	➢ Select CL in collaboration with members of staff and in accordance with the criteria.
• Prepare an action plan with CL and staff members.	➢ Organise staff meeting and solicit the views of all members.
• Sensitise staff to the CL training concept, its implications and the importance of the SBI/CBI programme.	➢ Organise meetings for CL to brief the staff after every CL training.
• Ensure that at least two SBI/CBI programmes are organised every term.	➢ Collate teachers' views on challenging topics and decide which ones should be discussed during the SBI/CBI programme. ➢ Release funds for the purchase of instructional materials for SBI/CBI. ➢ Make sure adequate preparations are made before SBI/CBI. ➢ Make sure that the right environment is created within the school for SBI/CBI to take place. ➢ Ensure that post- SBI/CBI discussions are held after every SBI/CBI.
• Keep records of all SBI/CBI including attendance.	➢ Appoint a secretary for every SBI/CBI and provide a book for the proceedings of SBI/CBI.

1.4.2. Curriculum Leader (CL)

CLs play a vital role in the facilitation of SBI/CBI. According to the INSET programme, they

are expected to work under the guidance of HTs in the organisation and delivery of SBI/CBI.

Their main responsibility is to sensitise and organise effective SBI/CBI for teachers. If SBI/CBI is not occurring at the expected frequency and teacher attendance is low, it may be that the CL is not being effective in sensitising teachers regarding its importance. It could also mean that the collaboration with the HT is weak.

CLs have the following terms of reference:

- On a regular basis, organize SBI/CBI on 'good practices' and 'record keeping' in schools, at least 2 times a term.
- Develop a termly plan on SBI/CBI with his/her HT.
- Ensure free flow of information on all SBI/CBI activities among staff members.
- Work in harmony with his/her HT and other teachers to see SBI/CBI as a useful means of increasing their capabilities in teaching all subjects at the Basic school level.
- Help equip and strengthen colleague teachers' capacity in teaching all subjects at the Basic school level.
- Be very approachable and willing to help other teachers to overcome difficulty in handling all challenging topics in the primary syllabus.
- Share knowledge (knowledge transfer) with fellow teachers.

Table 4: INSET Responsibilities of the CL

Curriculum Leader (CL)	
INSET Responsibilities	**Related INSET Tasks**
• Sensitise and organise effective SBI/CBI for teachers.	➢ Report on activities of CL training to sensitise staff to SBI/CBI programmes. ➢ Collate teachers' views on challenging topics and with the HT and other teachers decide which ones should be tackled during SBI/CBI. ➢ Prepare an action plan with the HT and staff members. ➢ Make sure that adequate preparations are made before SBI/CBI. ➢ Make sure that the right environment is created for SBI/CBI to take place.

Table 5: Comparison of tasks between HT and CL during PDS stages for SBI/CBI

	HT	CL
Plan	• Prepare School Performance Improvement Plan with CL and staff members – Organise staff meeting and solicit the views of all members – Ensure that at least two SBI/CBI programmes are organised in a term	• Support HT to prepare School Performance Improvement Plan
	• Support CL to Prepare SBI Session Planning Sheet for each SBI/CBI with staff members	• Prepare SBI Session Planning Sheet for each SBI/CBI with the HT and staff members
Do	• Make sure that adequate preparations are made before SBI/CBI – Release funds for the purchase of instructional materials for SBI/CBI	• Make sure that adequate preparations are made before SBI/CBI
	• Support CL to create the right environment for SBI/CBI	• Make sure that the right environment is created for SBI/CBI to take place with HT
		• Facilitate SBI / CBI with HT effectively. – Sharing of knowledge/ knowledge transfer to fellow teachers – Maintain discipline
	• Collate teachers' views on challenging topics and decide which ones should be discussed during SBI/CBI programme	• Collate teachers' views on challenging topics and with the head and other teachers decide which ones should be tackled during next SBI/CBI
See	• Ensure that post- SBI/CBI discussions are held after every SBI/CBI	• Ensure that post- SBI/CBI discussions are held after every SBI/CBI
	• Complete Activity Completion Report with CL	• Complete Activity Completion Report with HT
	• Keep records of all SBI/CBI including attendance – Appoint a secretary for every SBI/CBI and provide a book for the proceedings of SBI/CBI	

1.4.3. Teacher

The main purpose of SBI/CBI is to improve teachers' competencies to deliver effective lessons in all subjects. Ultimately, SBI or CBI is about improving teachers' classroom practices so that it impacts positively on pupils' learning and achievement.

Pupils' performance in achievement tests and performance monitoring tests are a proxy measure of teachers' classroom performance. One way in which we can determine the impact of teachers' performance on pupils' learning and achievement is to assess the quality of their instructional practices.

The disaggregated competencies focus on three aspects: lesson plans (assessed through inspection of lesson plans), lesson delivery (through direct observation) and classroom management (through direct observation).

Teachers will only improve their pedagogical practices if they actively participate in SBI/CBI and apply what they learn in their classrooms.

Table 6: INSET Responsibilities of Teachers

Teachers	
INSET Responsibilities	**Related INSET Tasks**
• Collaborate with HT and CL to prepare action plans.	➢ Submit challenging topics and contribute to discussions for the running of SBI/CBI.
• Assist CL to prepare adequately for the SBI/CBI.	➢ Prepare Teaching and Learning Materials (TLMs), give professional suggestions and facilitate SBI/CBI when necessary.
• Implement improved teaching and learning activities from SBI/CBI.	➢ Implement instructional plans. ➢ Develop skills in teaching methodology and delivery. ➢ Implement improved classroom organisation and management practices.

1.4.4. Selection of CLs

HT is expected to nominate a teacher as CL with the cooperation of DTST at the beginning of each academic year. (However, it is desirable that the selection is conducted after HT orientation because some instructions for the selection are given in the orientation.)

The following criteria should be considered:

Table 7: Criteria for Selection of CLs

Essential	Desirable
• Qualified professional teachers in basic schools. • At least 3 years teaching experience in primary school. • Interest in and of Science and Mathematics.	• Evidence of INSET attendance. • Motivated to master instructional skills • Leadership skills. • Ability to cooperate with HTs.

When HT selects CL, the HT is to use the CL Recommendation Form (Form 1). In this form, basic information on CL (such as name, age, sex, certification, teaching experience, interest in subject matter and knowledge of subject) is to be indicated. And the HT should also write his/her recommendation why the teacher is selected as CL in the form.

After the form is filled in, the HT is supposed to have the approval of DTST for the selection of CL. Firstly, the HT submits the form to DIU (for example, at the school visit of CS or HT meeting etc.). Secondly, the DIU gives it to DTST. Then, the DTST reads it carefully and put their sigunature as their approval in the form if the selection is well considered. The approval of DTST should be done before the CL participates CL orientation. If the DTST decides that the selection is unsuitable, the HT is informed the decision and needs to select again.

1.5. Background and Rationale of SBI/CBI

It is teachers who plan, implement, evaluate and improve lessons, and lessons are the core of knowledge acquisition in education. It is impossible to ignore the quality of teachers when talking about improving the quality of lessons. Therefore, it is necessary to consider how to improve teachers' competencies.

SBI/CBI aims at improving the quality of teachers through ensuring "Continous Professional Development (CPD)" for each teacher and establishing "Collegiality" for a group of teachers. It is through a lesson that the improvement will be effected.

1.5.1. Continuous Professional Development (CPD)

"CPD" is one of the key concerns in the effort to improve the quality of teachers and lessons.

It is not easy to improve the quality of teachers by offering training through which teachers acquire knowledge only. Such opportunities will become a sort of "book learning" rather than effective training.

Professional development for teachers should be a continuous process. This is because the competencies (i.e. knowledge, skills, attitudes related to teaching) required to be a high quality teacher cannot be static and teachers must always keep pace with the changing trends and curriculum reforms. Therefore, it is important that they make best efforts to develop their own competencies continuously on the basis of their daily teaching activities and experiences at the classroom level.

1.5.2. Collegiality

"Collegiality" is another key issue to consider in the plan to improve the quality of teachers and lessons.

Individually, teachers may have limitations or difficulties in their effort to improve their teaching competencies. In order to overcome such limitations or difficulties, they need to collaborate with each other as colleague-professionals.

Colleagues are those explicitly united by a common purpose and respecting each other's competencies to work toward that purpose. Thus, the word "Collegiality" can connote respect for another's commitment to the common purpose and ability to work towards it.

Through such collegiality, teachers can share their teaching experiences, ideas and knowledge, and can influence one another to employ good teaching practices. Finally, they can improve their teaching competencies through interacting with one another.

1.5.3. Three Elements of a Lesson

The three basic elements of a lesson are "Pupils", "Teacher" and the "Teaching Content" that is dealt with in the course of a lesson. The existence of a "Balanced Relation among the Three Elements" is a precondition for a "Good Lesson".

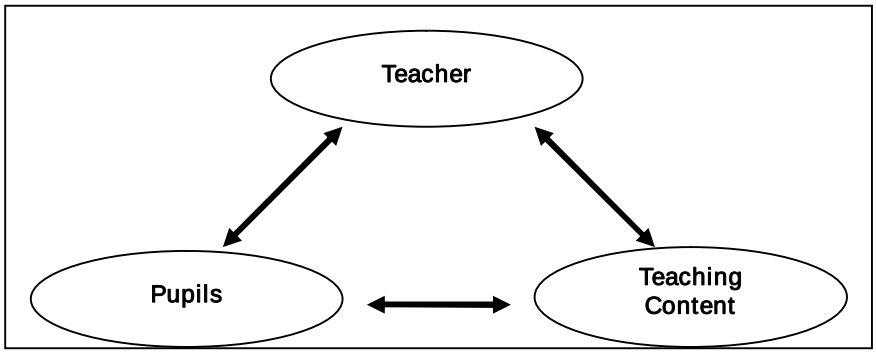


Fig. 1: Pattern of Links between the Three Constituent Elements of a Lesson

A lesson does not simply consist of the teacher carrying out the act of teaching in line with the demands of the pupils, nor does it consist simply of pupils engaging with the teaching content on their own initiative, nor is it enough simply for the teacher to copy the contents of a textbook onto the chalkboard.

A teacher presents the teaching content which he/she has studied adequately in the course of preparing for a lesson. At the same time, the teacher constantly observes his/her pupils' reactions to the presentation. Then, he/she provides the pupils with more relevant activities considering their reactions. Finally, drawing on the pupils' abilities, the teacher leads them to achieve the objectives of the lesson.

During this process, it may be that the pupils in a particular class will show a reaction that goes beyond what the teacher has anticipated, in which case the competencies with which the teacher has put the lesson together will determine whether or not that teacher can make use of the pupils' reaction and use it to enliven and enrich the lesson. This kind of situation can be termed a "Balanced Relation among the Three Elements", and in such a case the lesson will be evaluated highly.

1.6. Lesson Study

Fig. 2: Teachers collaborating

A "Lesson Study" is a methodology denoting collaborative action by teachers to improve the quality of lessons. (See Fig.2) It is a device for lesson improvement based on the principle of "Plan-Do-See". In other words "colleague teachers study teaching content as a group, teach a class, discuss their teaching and then use the results of the discussion for the next study session". This involves studying and researching effective teaching methods and ways of conducting a class. It features a process whereby colleague teachers discuss a lesson conducted by one of them.

1.6.1. Process of Lesson Study

A Lesson Study is made up of three stages, namely: Study of Teaching content, Demonstration Lesson and Reflection on the Lesson.

The succession of these three stages can be expressed as shown in Fig.3.

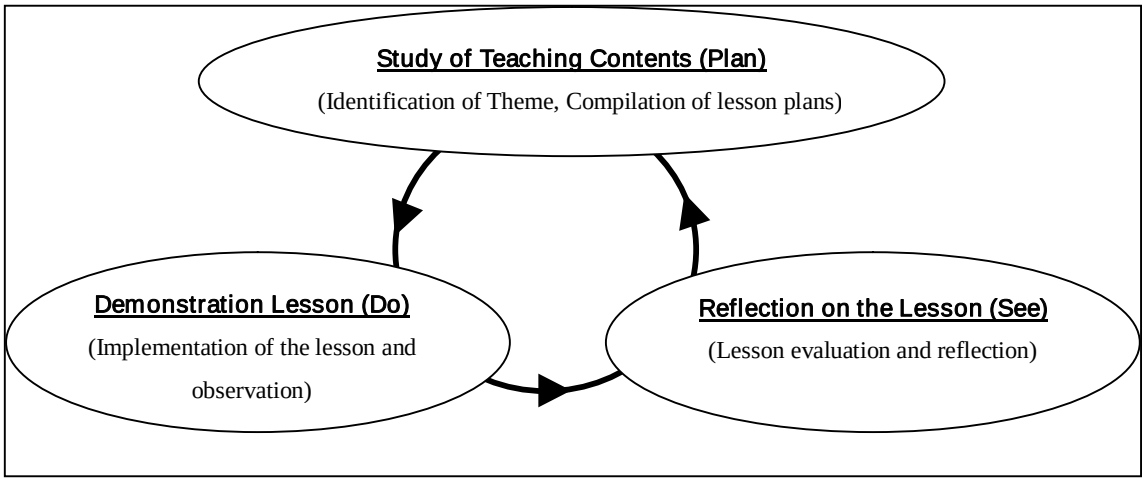


Fig. 3: Process of Lesson Study

These main stages involve a number of successive sub-stages as follows:

a) Identification of a theme and preparation of lesson plans (Plan)
b) Implementation of the lesson (Do)
c) Evaluation and reflection on the lesson (See)
d) Revision of the lesson (Plan)
e) Implementation of the revised lesson (Do)

f) Evaluation and reflection (See)

g) Sharing of the results.

Through this type of format, it is possible to see the Plan-Do-See cycle coming into being. Repetition of the cycle is needed and the consequent refinement of the lesson constitutes the process of lesson study.

A detailed study of the three stages is as follows:

A) Study of Teaching Content

"Study of Teaching Content" is a succession of activities related to the teaching content, such as selection of a teacing content, detailed analysis of the content, evidence of deep understanding of the essence of the content, planning of a suitable lesson on the content to suit the real situation of the pupils concerned, and development of a lesson plan

B) Demonstration Lesson

In "Demonstration Lesson", an experimental lesson is conducted, based on the lesson plan prepared during the study of teaching content. During the demonstration lesson, colleague teachers, and sometimes supervisors (such as HT, CS, DTST, District INSET unit and so on) sit in and watch, observing carefully every move the teacher and pupils make so as to be able to give constructive feedback after the lesson.

C) Reflection on the Lesson

After the lesson, then comes the time for the "Reflection on the Lesson" (exchange of opinions concerning the lesson). The meeting normally starts with an explanation of the lesson objectives given by the teacher. After this, all the participant-observers express their opinions or ask questions in turn, clarifying the lesson objectives, or commenting on the basis of their own experience, about such issues as the learning activities of the pupils during the experimental lesson, the role of the teacher, other teaching methods, and so on, so that a lively discussion on a wide-range of issues ensues. Fig.4 shows colleague teachers reflecting on a lesson that has been taught.

Fig. 4: Colleague teachers reflecting on a lesson

1.6.2. Significance of the Lesson Study

A Lesson Study offers concrete models for improvement at the classroom level, and its significance can be characterized in terms of the ways in which:

- The national-level curriculum is adapted and contextualised to suit the realities of the environment and the classroom.
- Through opportunities for joint study, teaching skills and an exemplar of good teaching practices are passed on and continue to be developed.
- Teachers gain self-confidence, and improve their competencies on their own initiative.

a) Concrete Embodiment of the Syllabus

The Syllabus exists as the national-level curriculum, and textbooks are written based on it. However, even the most splendid educational objectives and high-level teaching content can hardly have any meaning unless they are given specific form and developed within the framework of the classroom lesson. The Lesson Study, in which teachers are the main agents, is a means of embodying the goals of the national curriculum in real lessons in the context of the school. It can be seen as a bridge between the ideal concept and the real world.

b) Transmission and Development of Teaching Skills, and the Formation of the "Image" of a Teacher

Lesson Study has come to play an important role in the accumulation and transfer/sharing of teaching skills as well as in the formation of the image of a teacher[1]. In Lesson Study, a group of colleague teachers and supervisors will assemble together, observe the lesson conducted by one teacher, and during the subsequent lesson discussion meeting, exchange opinions, and thereby deepen their own knowledge and understanding of teaching content, pupils's learning, lesson composition and so on. Teachers who do this learn from each other, and by means of the repeatedprocess of finding solutions to educational issues through teaching in this way, teachers learn and share their teaching skills with one another, and at the same time, a common pattern of thinking with regard to teaching and learning is formed among the teachers concerned. (See Fig.5)

Fig. 5: Teachers sharing teaching skills

Furthermore, in preparation towards the experimental lesson, the teacher develops the lesson plan based on the teaching content which has been subjected to thorough study and examination, and implements the planned lesson. There are a number of occasions when during the preparation of such a lesson, the teacher integrates innovative ideas and teaching methods, and implements them in the course of the lesson. In the discussion that follows the lesson, constructive comments on the lesson will be made from many different angles, and points for improvement are clarified. Through cooperation among the educationists concerned, the process set out here is repeated many times, and as a result, there is a high possibility that new teaching content and methods will emerge and be developed as a innovative ideas for teachers. The Lesson Study has a way of unearthing hidden potential to develop new teaching content and methods.

[1] The pattern of thinking that forms the basis of what it means to be a teacher is not formed by Lesson Study alone. Before any person becomes a teacher, that person will have passed through 15 to16 years of education as a school pupil. During that time, the pupil will have been taught by teachers almost everyday, and an image of what teaching is all about will have been absorbed, albeit unconsciously, and internalized by the pupil. In addition, during the teacher training course, the students will have spent every day studying how to become a teacher, with the shared concept of an ideal teacher constantly in mind, and one can say that as a result, the thinking that constitutes the foundation of that person as a teacher, i.e. the person's view of education, of learning, of children and of teaching contents, will to a certain extent have become shared knowledge and perceptions.

c) Formation of Ability and Self-Confidence in Teachers

In the normal course of events, the teacher is the only educator in a classroom, and that single teacher delivers the lesson to several tens of pupils.(See Fig.6) Moreover, if the objective is to achieve a "Good Lesson", then a "Balanced Relation among the Three Elements" is always being maintained, linking the teacher with the pupils and with the teaching content. The teacher presents afresh the carefully scrutinized teaching content and develops the lesson, all the time carefully observing the state of the pupils and their reactions, and leads the pupils toward realization of the objectives that have been set for that lesson. Whether the lesson will be a success or not depends on the ability of the teacher. Within the context of this situation, the teacher is expected to conduct self-examination on whether the lesson plan, the teaching methods and skills and so on, that will be used in implementing it, are appropriate for the lesson in question. To expect all this is in fact to make an exceedingly difficult demand on the teacher.

Fig. 6: A teacher delivers a lesson

Lesson study offers an effective remedy to problems of this kind. By having one's lesson evaluated by a third party, the strong points and weak points of the lesson can be clarified. Confirmation of strong points is linked to increased self-confidence, and the teacher is enabled to devise techniques which will utilize these strong points in the next lesson. With regard to the weak points too, methods of improvement can be identified, and with intensified efforts on the teacher's part, it will be possible for solutions to the problems to be found.

In addition, analytical observation of another teacher's lesson is linked to strengthening of one's own reflective capacities, thereby creating opportunities for discovering new lesson styles and effective teaching methods.

As shown in these pages, lesson study can be seen as the most effective method of enhancing the competencies of a teacher to conduct a critical appraisal and be able to consider another teacher's teaching. Also it develops the competencies to construct lessons and to carry out teaching in the classroom, at the same time as providing opportunities to strengthen one's strong points and overcome the weaknesses.

2. Annual Plan and Budget

2.1. Recommended SBI/CBI Annual Schedule and Time Allocation

The CL with the cooperation of the HT and other staff members should organise SBI/CBI at least twice a term, i.e. at least six sessions in an academic year. Refer to Table 8.

Table 8: SBI/CBI Annual Schedule

1st Term				2nd Term				3rd Term			
Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
SBI/CBI Annual Schedule (◎ SBI/CBI, △ Information Exchange Seminar[2])											
△	◎	◎	Holiday	△	◎	◎	Easter	△	◎	◎	Long Vacation

The date and time when each session of SBI/CBI is conducted will be decided in consideration of the local conditions of each school. The HT and CL should select convenient dates and time for conducting SBI/CBI when annual school activities are being prepared (at the beginning of the academic year).

2.2. SBI/CBI Annual Plan Sheet

When the date and time are decided, the CL is also supposed to consider teachers who will conduct demonstration activity, the number of participants, materials or items necessary for the SBI/CBI activities. Then the SBI/CBI Annual Plan Sheet (Form 2) should be completed with such information so that each session of SBI/CBI will be implemented successfully.

2.3. Budget for SBI/CBI (Capitation Grants[3])

The HT is expected to release funds for the purchase of instructional materials for each session of SBI/CBI. So the HT is supposed to consider how to manage the school's funds properly for better implementation of SBI/CBI.

In the next part, we are going to see one of the most useful resources for carrying out SBI/CBI, namely "Capitation Grants" set up by the Ministry of Education and Sports in the 2005/2006 academic year.

2.3.1. Background

The Ministry of Education and Sports has set up a Capitation grants Scheme, commencing 2005/2006 academic year, whereby every **Basic School** receives an amount of ¢30,000 per pupil enrolled. This should serve to remove the financial barrier that prevented pupils from going to school at the basic level.

The utilisation of the Capitation grants has been designed to empower the schools to effectively use financial resources to plan and carry out school quality improvement activities. The process of planning activities should be participatory and transparent. The grant is therefore expected to serve as an opportunity to help build school level capacity to effectively implement fiscal decentralization – which is a long term goal of the Government of Ghana.

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[2] This seminar is to share the lessons learnt from the implemented SBI/CBIs in a district with DIU, DTST, HT and CL so that the subsequent SBI/CBIs (even other INSET activities in the district) will be improved.

[3] GUIDELINES FOR THE DISTRIBUTION AND UTILISATION OF CAPITATION GRANTS TO BASIC SCHOOLS, Ghana Education Service

2.3.2. Selection of Schools

All registered public schools with the Ghana Education Service in all districts are to benefit from the Capitation Grants. These schools should have a code with Education Management Information System (EMIS) as well as the Integrated Personnel Payroll and Database (IPPD) to facilitate monitoring.

2.3.3. The Number of Pupils

The maximum number of pupils per school allowed for each year is to be determined in advance for audit purposes. It is advisable that the actual enrollment at the end of the third term for the previous year is used as the base and projected by an expected gross enrollment to get the estimated number of pupils for budget purposes. Enrollment numbers for actual disbursement, however, should be based on actual figures.

2.3.4. Eligible Expenditures

The capitation grants are to be used to support the implementation of School Performance Improvement Plans (SPIP, Form A).

2.3.5. Management of the Grant

The key players in the management of the Capitation grants are shown in Table 9.

Table 9: Key players in the Management of the Grant

Key Players	Roles
District Director of Education Asst Director – Supervision	• to provide the overall oversight and support towards the implementation of the SPIP • to approve the SPIPs for each school in the district • to ensure the compliance with all requirements • to ensure the opening of bank accounts and the flow of funds on timely basis to each school
District Accountant	• to maintain proper books of accounts and other records of all transactions • to account for all funds received and transferred to the schools • to provide financial and other information required by management to control the effective implementation of the capitation grants
Circuit Supervisor	• to provide the day to day supervision on the implementation of the SPIPs
SMCs Head teachers Assistant Head teachers	• to ensure the effective utilisation of the capitation grants • to implement the activities as provided in the SPIPs • to ensure the proper accountability of all funds received and utilised in the Schools

2.3.6. Special Bank Account

The District Education Office would open a Special Account into which funds for the Capitation Grants would be lodged. The signatories to this account are the District Director of Education and the District Accountant. To ensure smooth implementation of the schools' programmes, separate bank accounts would also be opened by the district for each school. The signatories to the school's account are the head teacher and his assistant.

2.3.7. Release of Funds

A projected estimate of enrollment levels in each school is made at the beginning of each academic year (based on the GER for the district). This estimate is the basis for the transfer of 50% of funds to the school at the beginning of the first term. Subsequent transfers for the first

term are dependent on the submission of adequate returns on the actual enrollment for the school in the course of the term. For the second and third terms, based on the enrollment levels as established in the first term, funds are to be transferred to schools at the beginning of the term. Efforts should, however, be made to confirm these enrollment figures due to attritions.

2.3.8. Monitoring and Evaluation

The Circuit Supervisor is to visit each school twice a term and report to the District Education Office on the ff:

- Abolition of all forms of levies in the school.
- Implementation status of the SPIP.
- Submission of all reports on timely basis.

The District Director as well as the District Teacher Support Team (DTST) and District Head Teacher Advisor are to pay regular visits to each school to review progress on implementation of activities at each school.

Progress Reports (Forms G, H and I) are to be submitted by the Head teacher through the School Management Committee (SMC) to the District Director of Education.

The Regional Monitoring Teams are to monitor and report on the disbursement and utilization of funds at the Districts and Schools respectively on termly basis.

2.3.9. Audit

The GES Internal Auditors will monitor the school's accounts, and will conduct at least one audit of the utilization of the capitation grants half yearly and will submit copies of their report to the SMC, DDE and Regional Director of Education (RDE).

2.4. How to apply for "Capitation grants"

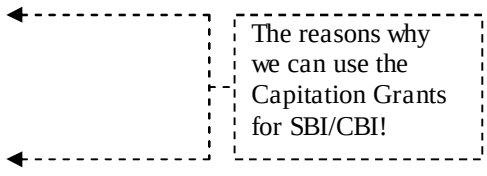
2.4.1. Preparation of School Performance Improvement Plan (SPIP)

A SPIP is to be designed to cover the following areas:

- Components/Targets
- Action to be taken
- Who is Responsible
- Resources needed
- Time Frame
- Who Monitors

Some of the key activities to be undertaken are:

- Enrollment Drive
- Provision of Teaching and Learning Materials
- School Management (including T&T and stationery)
- Community and School Relationship
- Support to Needy Pupils
- School and Cluster based In-Service Training
- Minor Repairs
- Payment of Sports and Culture Levies (to be approved nationally)



The SPIP is to be prepared by the head teacher/staff with the approval of the SMC. When the SPIP is prepared, the HT and the SMC should agree on the plan. It is to cover the whole academic year but broken down into terms. The SMC is to oversee the implementation of the

SPIP.

The SPIP is then forwarded to the DDE for review and approval. The review will ensure that the activities to be undertaken are in line with the Education Strategic Plan and other priority areas of education.

2.4.2. Disbursement Process

The executor of an activity within the SPIP applies to the head teacher for funds with a Request Form. (Form B). Cash equivalent to that activity is withdrawn from the bank, an Advance Form (Form C) is completed and cash given to the executor to be used for the purpose as indicated on the request form. After the completion of the activity, the executor submits the relevant documentation (receipts, honour certificates and activity report) to the head teacher and completes an Accounting for Advances Form (Form D) to end the process.

2.4.3. Management Control

At the school level, requests for funds are to be endorsed by both the SMC chairman and the head teacher. These persons are jointly responsible for the utilization of the funds towards the attainment of the targets as set in the SPIP.

2.4.4. Record Keeping

The school has to maintain financial records (Capitation grants Cash Book - Form F) which report all capitation grants received and disbursed with all appropriate receipts and documentation required. These records are to be made available for review by the SMC, the District Education Office and the Audit, Regional Monitoring Team and other School Inspectors.

2.4.5. Reports

Monthly and Quarterly Reports describing activities completed and under way during the period, together with a statement of expenditures for these activities for the period are to be sent to the District Education Office by the head teacher and the SMC Chairman. The District Education Office is also to report on quarterly basis to the Regional Director and Director General on the operations of the Capitation grants.

These reports include:

- Monthly Capitation grants Expenditure Returns ——————Form G
- Monthly Capitation grants Activity Completion Report ——Form H
- Termly Capitation grants Status Report ————————————Form I

3. Preparation for SBI/CBI

Before implementing each session of SBI/CBI, the CL is supposed to plan the session with cooperation from the HT and other fellow teachers. The "SBI/CBI Session Planning Sheet" (Form 3) will be used for the planning, indicating date, demonstrator, necessary materials/items, and so on. However, when the preparation is ongoing, there is the need to consider some specific aspects, such as setting themes for the session, selecting a demonstrator for the session, planning activities and so on. The following discusses these aspects.

3.1. Setting Themes for the Session

Setting themes for each session of SBI/CBI is the most important aspect of the planning and implementation of the session. The themes are supposed to be the issues which emerge from daily teaching activities in the school and should therefore be resolved by teachers themselves. If they are not set appropriately, it means that the participants will lose focus. Without setting proper themes, it is difficult for teachers to work with the aim of improving the quality of lessons.

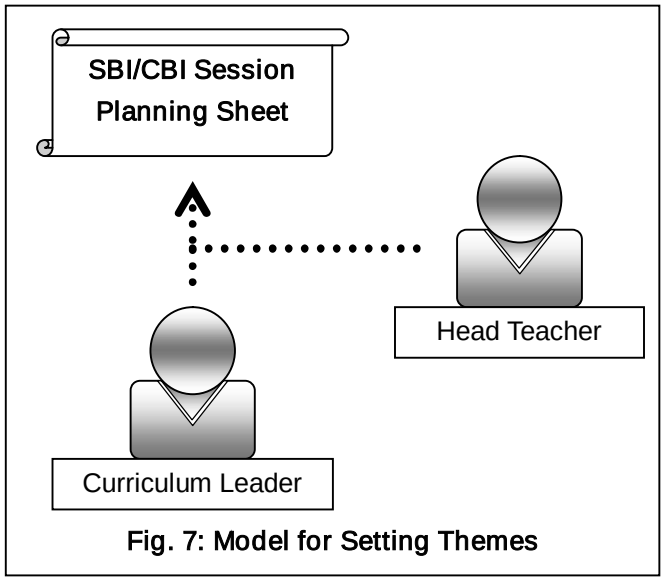


Fig. 7: Model for Setting Themes

The HT is supposed to observe and consider the current status of the teaching activities conducted by his/her colleagues and the issues or needs related to their teaching in order to set relevant themes. The best way to identify relevant themes is to encourage information exchange and discussion among colleague teachers in daily teaching activities. See fig. 7 for a model for setting themes.

See Module 4 to find examples of themes setting. It has various topics on educational issues and needs related to our teaching activities. These topics are used as the themes of the session of SBI/CBI, and shown in Table 10:

Table 10: List of Topics in Module 5

No.	Topic in Module 5
1	Study of the Primary School Curriculum Materials
2	Good Primary Practices
3	Teaching and Learning Activities
4	Lesson Plan Preparation and Presentation
5	Assessment
6	English as a Tool to support Understanding of Science and Mathematics

The topics in Table 10 can be selected if it is applicable to the school. The best people to identify educational issues or professional needs of teachers in the school are the teachers themselves. So make an effort to foster good communication links with colleague teachers in daily school activities, and try to set as many adequate themes as possible towards the improvement of lessons.

3.2. Selection of Demonstrator

A teacher who will conduct a demonstration activity (lesson or TLM Preparation/usage) is one of the key players in the SBI/CBI. Therefore, selecting a teacher as a "Demonstrator" is very important and great attention should be paid here. While the selection depends partly on the kinds of themes for each session, below are four recommended criteria for selecting the demonstrator.

- Experience-Based Selection
- Subject-Based Selection
- Class-Based Selection
- Suggestion-Based Selection

a) Experience-Based Selection

An experienced teacher has a variety of teaching experiences, including both successful and unsuccessful ones. Their current competencies of teaching are on the basis that they might have had several opportunities to address the challenges they have encountered in their effort at improving the quality of their lessons. We can learn a lot of things from the experiences of these teachers, such as the challenge teachers they have encountered, their current teaching practices, their methodologies of teaching and so on. Therefore, it is quite meaningful to select an experienced teacher as the demonstrator of a session for the improvement of lessons.

Meanwhile, since teachers who have just graduated from teachers' college or university and started working are inexperienced in teaching, the knowledge they have acquired about teaching is not assessed in actual classrooms. In order for such teachers to improve their teaching competencies, it is helpful for them to make their classes open for observations and suggestions from their colleague teachers. Meanwhile, despite their limited practices, the inexperienced teachers may have some updated and fresh knowledge, skills or methods of teaching which they might have learnt at teachers' college or university recently. If they are allowed to give demonstration lessons, then we may be able to get such new ideas in teaching through that. It is also helpful for other teachers to learn some new approaches to teaching. See fig. 8 for a model for experience-based selection.

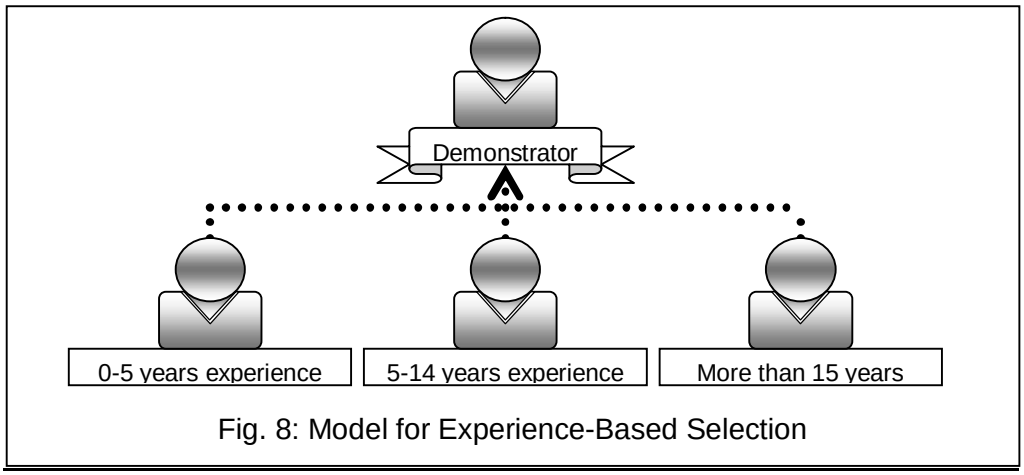


Fig. 8: Model for Experience-Based Selection

b) Subject-Based Selection

Generally speaking, teachers may not be all round. However, every teacher has different characteristics and experiences, and each may have good points in the teaching of specific subjects. If teachers can share such strong points in teaching a certain subject, which they

should learn, it becomes much easier to improve the quality of their teaching activities. Selecting teachers who are good at teaching specific subjects is also acceptable for the facilitation of SBI/CBI. See fig. 9 for a model for subject-based selection.

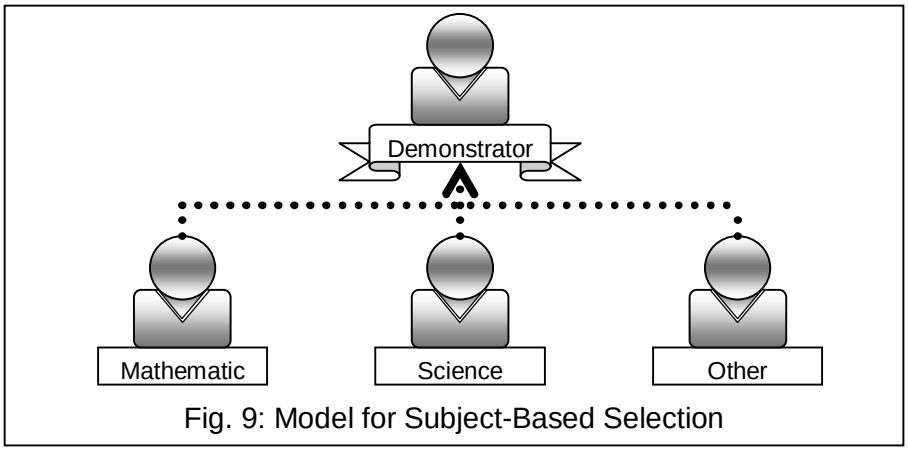


Fig. 9: Model for Subject-Based Selection

c) Class-Based Selection

Each class has particular issues which concern the development of the pupils at that level. If it is necessary to consider the issues related to each class in a school, this class-based selection is chosen. For example, when teachers identify low achievement of pupils in a certain topic as a problem, they may be able to relate its cause to previous learning and understanding of the topic. When teachers want to know the relation between their pupils' learning and understanding of a topic and the following topics in the next class, they may be able to consider the relation through observing lessons in upper classes. Therefore, this kind of selection is appropriate for battling with such issues which cut across classes. This can be done in collaboration with various class teachers. See fig. 10 for a model for class-based selection.

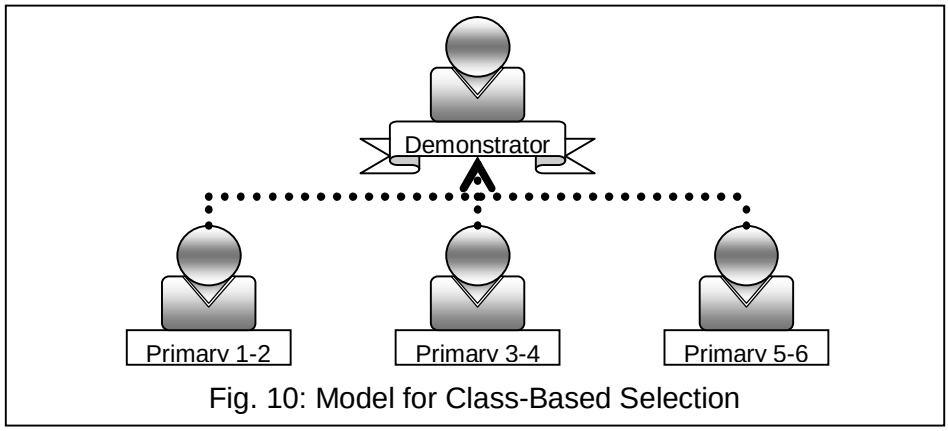


Fig. 10: Model for Class-Based Selection

d) Suggestion-Based Selection

Some of the teachers may have various suggestions on teaching methods, teaching-learning materials, and so on. SBI/CBI sessions are really the right opportunities for such teachers to share their suggestions with their colleagues, so that they can all examine them in actual practice and conduct critical discussion towards the improvement of the ideas. If such teachers can be found in your school, this selection is recommended.

3.3. Planning a Demonstration Activity

After selecting a demonstrator, he/she will start to plan a demonstration activity for a SBI/CBI session. This should be done with the cooperation of the CL (note that the CL can be a

demonstrator). See fig. 11 for planning for SBI/CBI demonstration activity.

3.3.1. Planning and studying the activity

The CL and demonstrator will plan what activity they want to do during the SBI/CBI. More importantly, they will spend ample time to study the activity they are going to do. They can discuss it with their colleague teachers and read reference books to arrive at a good idea. They can refer to **Module 4 for general pedagogy** and **Modules 5, 6 and other subject modules for sample lesson plans**.

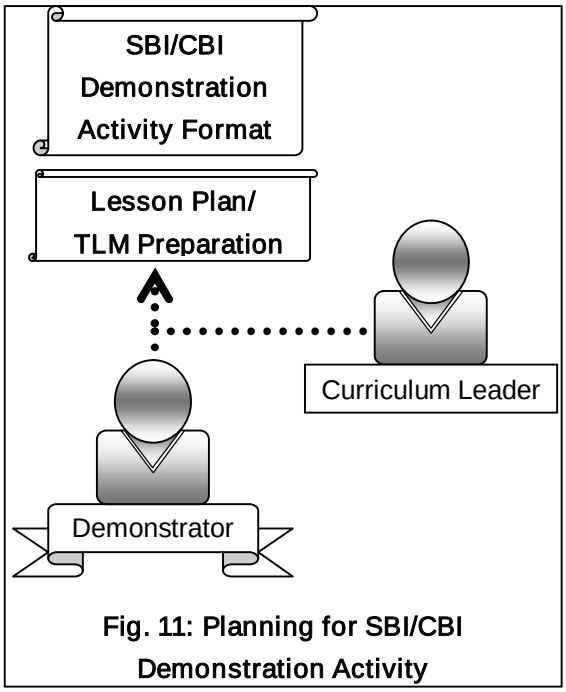


Fig. 11: Planning for SBI/CBI Demonstration Activity

If their choice of SBI/CBI activity is Demonstration Lesson or Peer Teaching, then, they will plan a lesson to demonstrate through studying a teaching content. For those who have chosen TLM preparation/usage for their SBI/CBI activity, a study of TLM should be done.

In planning the activity, they are supposed to develop a lesson plan (for a demonstration lesson) or a TLM Preparation/usage. They are also required to complete the "SBI/CBI Demonstration Activity Format"

3.3.2. Preparation of SBI/CBI Demonstration Activity Format

The "SBI/CBI Demonstration Activity Format" (Form 4) is used for indicating points on the demonstration activity and summarising the lesson plan or TLM Preparation/usage plan. It helps HTs and other supervisors to grasp the intentions and aims of the activity. In addition, the demonstrator or CL can also use the format to present their ideas in the pre/post-activity (discussion). Before SBI/CBI session begins, CL should receive the format as well as the lesson plan or TLM preparation/usage plan from the demonstrator.

3.3.3. Preparation of Lesson Plan (for Lesson Study and Peer Teaching)

When the demonstrator prepares the lesson plan for a SBI/CBI activity, he/she needs to consider the objectives, teaching/learning activities and materials, core points and evaluation/exercise of the lesson, and even the choice of the topic/sub-topic. They should be related to the themes of the session of SBI/CBI as much as possible. The demonstrator can prepare his/her own lesson plan or refer to sample lesson plans. The sample lesson plans are presented in the Modules 5 and 6. See Table 11 for List of Topics in Modules 5, 6 and other Subject Modules.

Table 11: List of Topics in Modules 5, 6 and other Subject Modules

Module 5: Mathematics	Module 6: Science	Other Subject
– Measurement (Area) – Operations on fractions (Multiplication)	– Water and Other Liquids – Porosity of Soils	(To be developed)
– Collecting and Handling Data (Constructing a pictograph) – Shape and Space (Right angles) – Investigation with number (Triangular numbers)	– Properties of Air – Rusting (Characteristics of Metals and Non-Metals) – Energy in the Production of Sound	(To be developed)

The demonstrator and CL can seek relevant information from Module 4, General Pedagogy. For example, Lesson Plan Preparation and Presentation in Module 4 should be useful.

3.3.4. Preparation of TLM Plan (for TLM Preparation/usage)

When the demonstrator prepares the TLM Preparation/usage for SBI/CBI activity, he/she needs to consider what materials to use and how these will be used in the lesson. The TLM should be related to the themes of the session of SBI/CBI as much as possible. While the demonstrator can develop his/her own TLM plan, he/she can refer to the resource books for ideas. Some of the sample lesson plans in Modules 5 and 6 include preparation and usage of TLM. Besides, the demonstrator and CL can seek relevant information from Module 4, General Pedagogy. For example, Teaching and Learning Activities in Module 4 should provide useful information. Good Primary Practice in Module 4 also talks about TLM and activity.

4. Implementation of SBI/CBI

4.1. General Information about SBI/CBI

Implementation of the SBI/CBI is divided into the three stages: **Pre-activity Discussion**, **Demonstration Activity** and **Post-activity Discussion**. The duration of each stage can be shown as in Table 12.

Table 12: Three Stages of SBI /CBI Activity and Time Allocation

	Pre-activity Discussion	Demonstration Activity	Post-activity Discussion
Duration	15 minutes	60 minutes	45 minutes
Demonstration Lesson	Instruction and Activity Observation Sheet Writing	Demonstration Lesson (and Observation)	Reflection on the Lesson
Peer Teaching	Instruction and Activity Observation Sheet Writing	Demonstration Lesson (and Observation)	Reflection on the Lesson
TLM Preparation/usage	Instruction and Activity Observation Sheet Writing	Demonstration of Preparation/usage of the TLM	Reflection on the Preparation/usage of the TLM

But the CL and HT can modify the time allocation, making it more suitable to the real teaching situations in their school. (For example, Pre-activity Discussion: 10 minutes, Demonstration Activity: 60 minutes, Post-Activity Discussion: 50 minutes etc.)

4.2. Pre-activity Discussion

The first part is "Pre-activity Discussion", in which the CL plays the role of a facilitator and gives colleagues the following introduction:

1. State the theme(s) for the session and its background (the reason why we are considering the themes through the session)
2. Introduce the demonstrator and his/her class, the subject and topic/sub-topic
3. Give participants instructions for the observation (how to use the observation sheet, the areas which the participants are expected to observe, and so on)
4. Set any other ground rules the group considers necessary (e.g. "Switch off mobile phones!" "Stay for the whole session!" "Participate actively!" "Complete the tasks!" and so on)

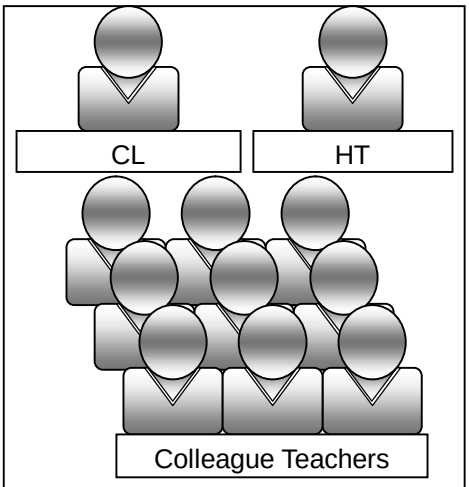


Fig. 12: CL giving instructions to colleagues

At the same time, all the participants should get copies of the "Activity Observation Sheet (Specific)" (Form 5-a) and follow the CL's instruction to fill out them. If the sheets are not available, the CL can ask the participants to use their notebooks for the task.

If there is the need to assess the demonstrator's teaching ability in terms of the performance standards of teachers, the CL can hand the "Lesson Observation Sheet (based on Performance Standard)" (Form 5-b) to HT or supervisors and ask them to fill in the sheet at the time of the lesson.

Table 13: Suggested Steps for "Pre-activity Discussion"

Step 1 (7 mins)	Instruction	CL gives colleague teachers necessary information such as the themes, the demonstrator, ground rules, areas to observe during the demonstration activity etc.
Step 2 (8 mins)	Activity Observation Sheet Writing	CL asks the colleague teachers to fill in the Activity Observation Sheet (putting general information, the themes of the session and so on)

4.3. Demonstration Activity

The second stage is the Demonstration Activity, in which the demonstrator conducts a well-planned activity. Meanwhile, other colleagues use the lesson plan or the TLM prepared by the demonstrator as reference material as they observe the activity, and put their own comments (including strong and challenging points) on the activity into the observation sheet given in the pre-activity discussion.

The observers should bear in mind that their own behaviours during the activity change the atmosphere of the class or make the pupils behave unsually. The atmosphere and their attitude must be kept as normal as possible so that the observers can observe and study the activity properly.

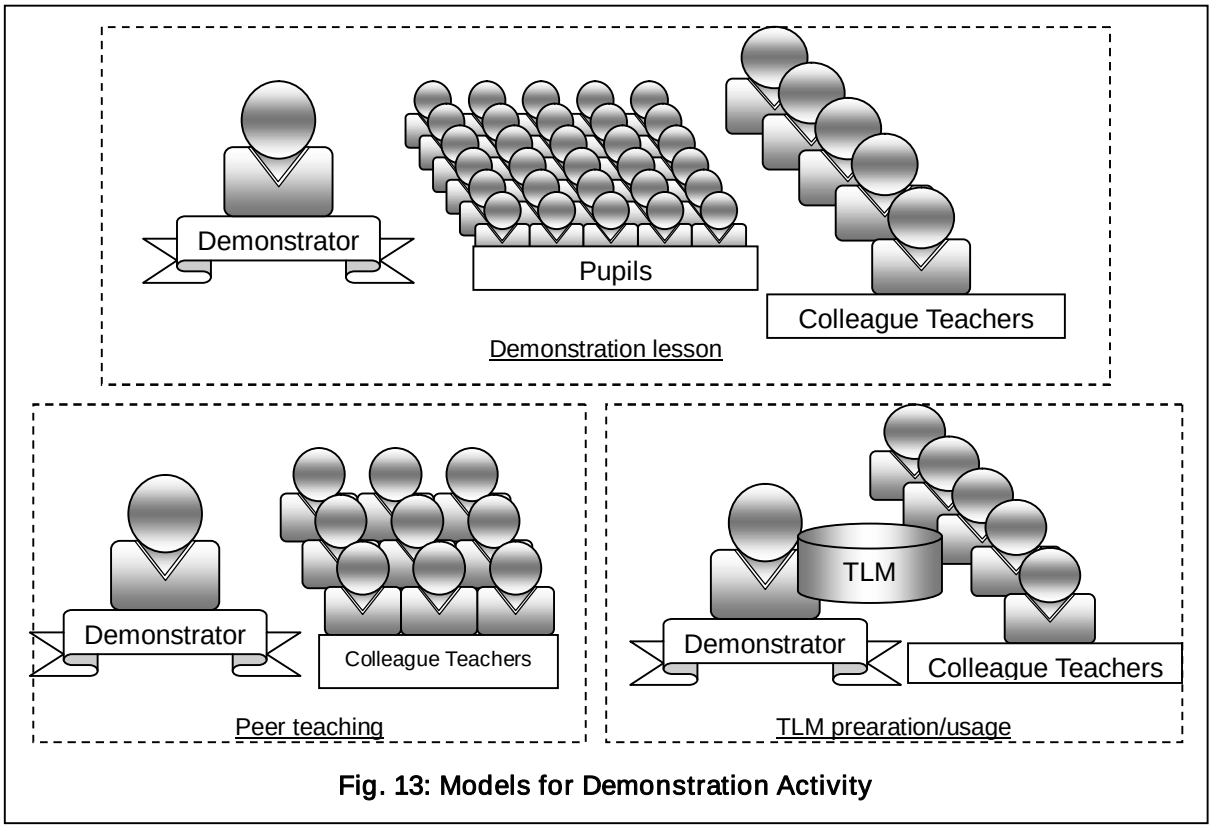


Fig. 13: Models for Demonstration Activity

Table 14: Suggested Steps for Demonstration Activity

Step 1	Before the Activity	Before starting the demonstration activity, CL leads all the colleague teachers to the classroom where the lesson is to be conducted. The demonstrator organises his/her class well so that the lesson can begin on time.
Step 2 (60 mins)	Demonstration Activity	The demonstrator conducts the demonstration activity. All the colleague teachers observe the activity in silence from the back of the classroom, putting comments into the observation sheets.
Step 3	After the Activity	CL leads all the colleague teachers to the room where the Post-activity Discussion will be held. The demonstrator gives his/her pupils necessary instructions (asking them to go home, giving some exercises, and so on)

4.4. Post-activity Discussion (Reflection on the Activity)

The last part is the Post-Lesson Discussion, in which the CL again facilitates the discussion while the demonstrator and observers exchange their opinions, ideas and so on.

Firstly, the demonstrator will present the rationale for the choice of the topic/sub-topic, the objectives and core points of the lesson, expected teaching/learning activities and materials and so on. Then, the demonstrator will give his/her comments on the demonstration activity, reporting on his/her self-assessment of the lesson as follows:

- Did it go according to plan?
- Was there a part of the lesson which was more of a challenge?
- How did he/she feel the pupils responded to the lesson?
- What could be improved next time?

Following the demonstrator's report, other teachers should be invited to give their comments (mentioning strong and challenging points) on the lesson. The comments are intended to be Cooperative and Constructive not Critical. They need to be Fruitful for all the teachers in improving their teaching practice.

It is important to avoid one or two teachers dominating the discussion and to encourage all the teachers to share their ideas and observations. For example, each teacher can be invited to give one feedback to the group.

The CL is expected to pay attention to the following points when facilitating the discussion:

- Point out similarities and differences in feedback
- Look for what is missing from the feedback as well as what is there
- Relate comments to the real world of the classroom
- Allow everyone an opportunity to give feedback if they want to
- Do not allow anyone to monopolise the discussion
- Summarise the comments

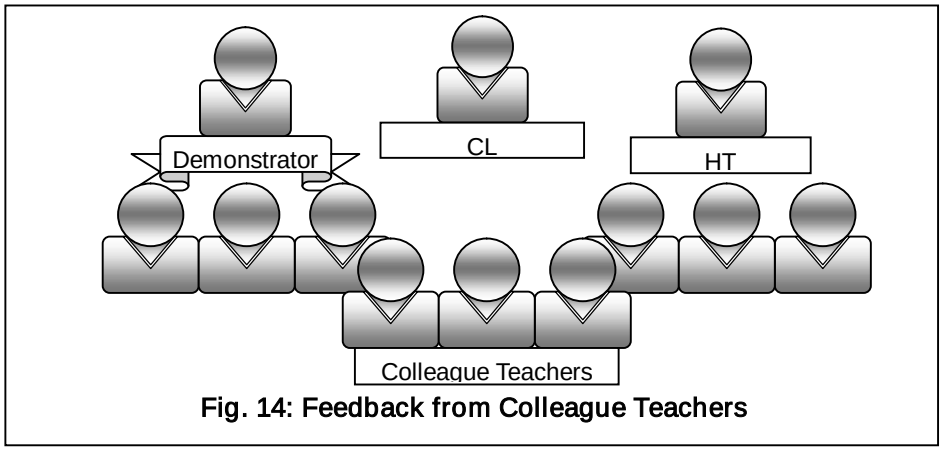


Fig. 14: Feedback from Colleague Teachers

One person from the staff should be appointed to **keep a record** of the key points discussed. The person should use the form "Record of Post-Activity Discussion Session" (Form 6).

Finally, the HT (or other supervisors) should be invited to give their comments on the discussion as the conclusion for the session of SBI/CBI.

Table 15: Suggested Steps for Post-activity Discussion

Step 1 (7 mins)	Comments from Demonstrator	CL invites the demonstrator to give colleague teachers his/her comments on the activity. (Plan, Implementation, Self-assessment and so on)
Step 2 (30 mins)	Discussion	CL invites the colleague teachers (including CL him/herself) to give their comments on the activity focusing on the themes of the session.
Step 3 (8 mins)	Conclusion by HT	CL invites HT (or supervisors) to give comments on the discussion.

4.5. Conclusion

As we have seen, this section shows us some ideas on how to conduct each session of SBI/CBI. However, the situations, the issues and the challenges for improving the quality of lessons are quite varied. Therefore, we need to consider how to make our SBI/CBI activities more relevant to our own situations.

This section shows only the suggested ideas for conducting SBI/CBI activities (not perfect ideas). So, we can create more adequate and meaningful SBI/CBI on the basis of this section in order to improve the quality of lessons.

5. Monitoring of SBI/CBI Activity in School

It is important to monitor and share information about SBI/CBI to improve the quality of teaching at the classroom level. Quality improvement can be realised through self-monitoring as well as feedback from district/national level. This chapter introduces the sheets for monitoring SBI/CBI activities and how to make information on SBI/CBI activities available to the district level.

5.1. Purpose and Procedure for Using Each Sheet

Monitoring Sheet for SBI/CBI activity should contain both quantitative and qualitative data. Quantitative data shows objective and numerical information about SBI/CBI implementation, such as number of times, attendance rate, etc. On the contrary, the qualitative data shows the information on respondents' views. The table shows the necessary sheets for monitoring SBI/CBI activities used for data collection at the school level.

Table 16: Sheets for Monitoring SBI/CBI Activity

Sheet	Form	Type of Data	Writer
– SBI/CBI Activity Observation Sheet – Record of Post-Activity Discussion Session – SBI/CBI Implementation Summary	Form 5 Form 6 Form 7	Qualitative	– Colleague Teacher – One of the colleague teachers – Head Teacher
– SBI/CBI Data Sheet	Form 8	Quantitative	– Head Teacher

1) SBI/CBI Data Sheet

Purpose

The purpose of the SBI/CBI Data Sheet is to record the implementation of SBI/CBI in the school accurately. It includes related information on SBI/CBI implementation such as the name of the demonstrator, the subject implemented, topics, the number of participants, etc.

Procedure

1. HT receives blank SBI/CBI Data Sheets from CS or at HT training.
2. HT attends SBI/CBI session and obtains information about the conduct of the activity.
3. HT fills in SBI/CBI Data Sheet.
4. HT duplicates the sheet.
5. HT files one sheet in school, and passes one to CS.

2) SBI/CBI Activity Observation Sheet

Purpose

The SBI/CBI activity observation sheet includes colleague teachers' comments made during SBI/CBI activity. It consists of strong points and points for discussion (issues). In the post-activity discussion, colleague teachers can use the sheets to share their opinions.

Procedure

1. Colleague teachers who attended the activity fill in the sheet.
2. Colleague teachers participate in post-activity discussion during which they refer to the

sheets.
3. CL collects the sheets after the post-activity discussion and submit them to HT.
4. HT files the sheets and stores them.

3) Record of Post-Activity Discussion Session

Purpose

This record summarises what was discussed at the post-activity discussion session.

Procedure

1. CL assigns one teacher as a memo taker.
2. The teacher picks up some major comments and write up the record sheet.
3. CL collects the record after the post-activity discussion and submit it to the HT.
4. HT duplicates the sheet.
5. HT files one sheet in school, and passes one to CS as part of SBI/CBI Implementation Summary.

4) SBI/CBI Implementation Summary

Purpose

SBI/CBI implementation summary includes questionnaires with regard to the conduct of SBI/CBI and record of post-activity discussion. The school keeps its copy and send another copy to the district as a record of SBI/CBI activity. The district uses the information at Information Exchange Semniar, which is held per term among CLs, DTSTs, and DIU.

Procedure

1. HT fills in the first part, which is mainly about preparation and implementation of the activity.
2. HT compiles Record of Post-Activity Discussion.
3. HT submits SBI/CBI implementation summary to CS.

5.2. Responsibilities

The following table summarises the responsibilities of Colleague Teacher, CL, and HT with regard to monitoring SBI/CBI Activities.

Table 17: Responsibility of Colleague Teacher, CL, and HT in Monitoring

Name	Responsibility
Colleague teacher	– Give feedback to demonstrator - Fill in SBI/CBI Activity Observation Sheet after activities - Attend post-activity discussion - Take memo during post-activity discussion
CL	– Facillitate SBI/CBI activity - Conduct SBI/CBI Activity - Obtain SBI/CBI Activity Observation Sheet from colleague teachers - Submit SBI/CBI Activity Observation Sheets to HT
HT	– Manage and Evaluate SBI/CBI activity - Attend SBI/CBI activity and contribute to post-activity discussion - Submit all the monitoring sheets (SBI/CBI Activity Observation Sheets, SBI/CBI Implementation Summary, and SBI/CBI Data Sheet) to CS - File and store the monitoring sheets

5.3. Flow of the Sheets for Monitoring among HT, CL, and Colleague Teachers

Fig.15 shows how the sheets for monitoring SBI/CBI activities flow among HT, CL, and Colleague Teachers.

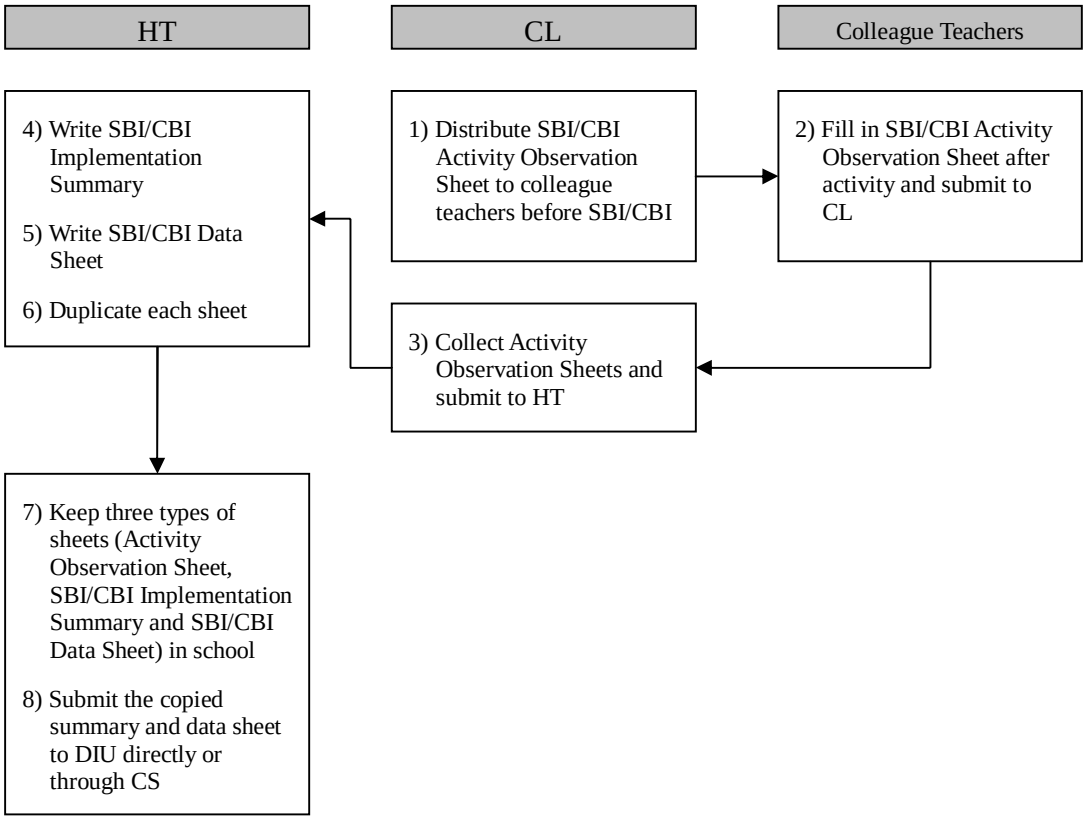


Fig. 15: Flow of the sheets for monitoring

6. Challenging Topics

6.1. Introduction

Some teachers in primary schools think that some topics are too difficult or challenging to teach. They call the topics Challenging Topics. The teachers claim that the topics require subject specialists to teach them. However, with adequate preparation, teaching these topics should not be problematic. It is a matter of preparation not qualification. A little bit of extra effort and time to prepare a lesson makes a big difference, helping teachers to improve their lessons greatly.

This section provides some useful information about challenging topics for CLs and teachers. Firstly, some challenging topics are identified. Secondly, the section gives what strategies we can use to tackle challenging topics. The fundamental principle that underlies the section is that teachers learn effectively through discussion and implementation of a lesson with their colleagues. In order to put this into practice, the section tries to use SBI/CBI, Curriculum Leader Training and Module 4.

6.2. Identification of Challenging Topics

6.2.1. Preferrd Topics

It is important to examine topics that teachers prefer to teach. When we think about the preferred topics, we need to consider reasons for preferring the topics. This should help us to see why some topics are thought to be challenging.

Teachers in Primary schools seem to prefer teaching some topics in Science. Some examples are:

Food, Plants, Animals, Water, Soil, Air, the Family, the Community

There are some reasons why primary school teachers prefer teaching the topics listed above other than others. They are shown below.

- The topics present real and familiar information.
- There are relevant curriculum materials and teaching/learning materials to use in lesson delivery.
- Local teaching and learning materials could be used.
- The topics lend themselves to the use of the activity method of teaching

6.2.2. Challenging Topics in Science and Mathematics

The following are some examples of challenging topics. These are based on opinions collected from teachers in an in-service programme for primary school teachers.

Science

Earthquakes, Movement of the Earth, Formation of Clouds, Force, Electrical Circuits, Constraints to Healthy Living: HIV/AIDS, Body Framework of Mammals, Magnets and non-magnets, Reflection of Light, Dispersal of fruit and seed, Pollination and fertilization in Plants

Mathematics

Operation of Fractions, Measurement of Area, Investigation with Numbers, Shape and Space, Collecting and Handling Data

It seems that the reasons why teachers perceive some topics as challenging topics vary from

teacher to teacher. However, some typical reasons are identifiable. For example, one of the reasons is that challenging topics are seen to be abstract because they are not seen in real life situations. Another reason can be that challenging topics lack relevant curriculum materials that teachers can use as resource materials. The following are also some reasons teachers gave as to why teachers perceive some topics as challenging topics.

- Difficulty in getting subject experts to support teachers to teach the challenging topics
- Lack of relevant teaching/learning materials to teach the challenging topics
- Inadequate funds for purchasing some teaching/learning materials e.g. consumable materials
- Low teachers' level of interest in some subjects (e.g. Mathematics and Science).
- The problem of untrained teachers who lack subject-specific knowledge and skills to handle the subject.
- Large class sizes do not lend themselves to the activity method of teaching.
- Inadequate preparation by the teachers
- Inadequate practical lessons in pre-service training at colleges due to the emphasis on passing of examination.

6.2.3. Summary

The challenging topics are seen to be abstract in nature. Besides, there seem to be no teaching/learning materials and relevant curriculum materials to support teachers to teach such topics. Some teachers do not use appropriate teaching methodology, and large class size makes the use of the activity method of teaching difficult.

These problems can be overcome by adopting good strategies in the teaching/learning processes.

6.3. Strategies for Teaching Challenging Topics

6.3.1. Introduction

Challenging topics can be made interesting and easy to teach if appropriate teaching strategies are used. To determine and use appropriate teaching strategies, adequate preparation for the lesson is needed. A good lesson preparation would help the teachers to teach well. What one can do is to discuss challenging topics with other teachers at the school.

It is always beneficial for teachers to share thoughts and ideas about challenging topics. By exchanging ideas, they can come up with a better strategy for teaching. Through discussion, teachers can improve their knowledge of subject content. Sharing difficulties and good practices of teaching challenging topics would benefit all.

It is advisable for teachers to discuss challenging topics from time to time. This does not have to be at a formal training setting that is held outside the school. This can be done at the school.

6.3.2. Using SBI/CBI for Challenging Topics

Although there are several ways for teachers to perform the above actions, one of the best ways is to use SBI/CBI. At SBI/CBI, teachers can share thoughts and ideas about strategies for teaching challenging topics. When they attend SBI/CBI meetings, teachers see a lesson demonstrated by one of their colleagues dealing with a challenging topic. This should help all teachers in their lesson preparations. After the demonstration lesson, teachers discuss the lesson conducted and consult one another. A CL is asked to facilitate the discussion while other teachers are also encouraged to do so. SBI/CBI provides good occasions for teachers to improve their knowledge and skills for the teaching of challenging topics. It should be also noted that the teachers can see how pupils take a lesson of a challenging topic.

To deal with challenging topics in SBI/CBI, the following basic steps can be applied.

Step 1: CL and teachers become aware of what challenging topics are.

Step 2: CL (or sometimes teachers) collects topics perceived by other teachers at the school as challenging.

Step 3: CL (or sometimes teachers) organizes a SBI/CBI.

Step 4: CL (or sometimes a teacher) conducts a demonstration lesson on a challenging topic and discuss for the improvement.

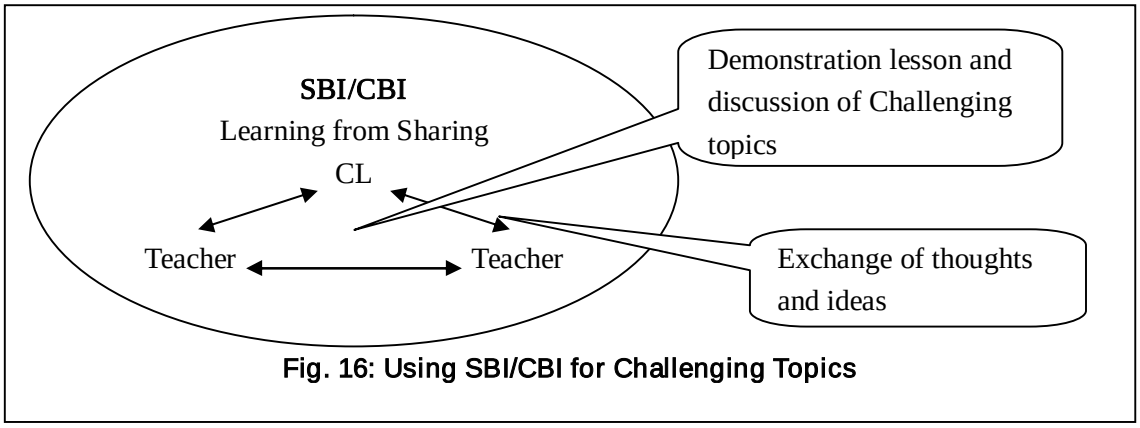


Fig. 16: Using SBI/CBI for Challenging Topics

6.3.3. Using CL Sourcebook Training for Treating Challenging Topics

The CL Sourcebook Training also offers an ideal opportunity for teachers as well as CLs to share thoughts and experience about challenging topics. Before the training, CLs are requested to list challenging topics with their colleague teachers. They discuss the challenging topics during the training, and try to develop a better way of teaching the topics. CLs go back to their schools with the developed lesson plans of challenging topics and teachers at the schools are expected to benefit from that in various ways.

Although there is **No Third Session** (of Sourcebook Training) programmed, it is significantly important for a CL to continue reflection and discussion with his/her colleagues at their own schools. They need to keep trying to improve SBI/CBI and their knowledge and skills for better teaching. One of the occasions for CLs and teachers to carry out another session can be **CBI**. Inviting teachers and CLs from other schools means there will be more to share. This should be an excellent opportunity for all.

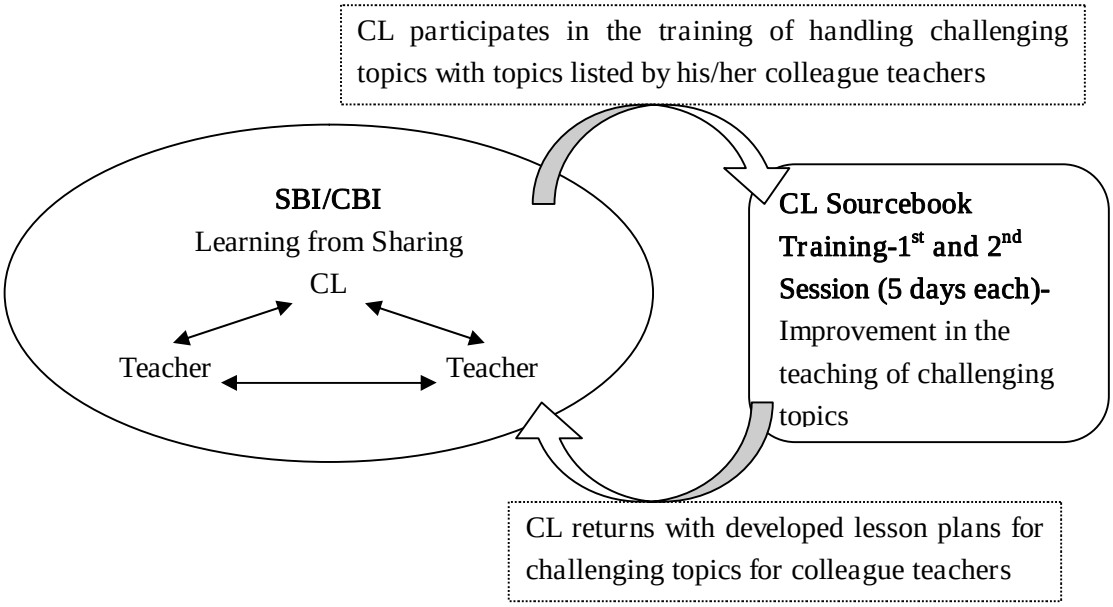


Fig. 17: CL Sourcebook Training for Handling Challenging Topics

6.3.4. Using the Reference Resources for Teaching Challenging Topics

Whether at SBI/CBI, CL Sourcebook Training or at any other occasion, CLs and teachers are encouraged to refer to various resources when discussing how they can improve teaching and learning of challenging topics. CLs and teachers should make use of available resources and materials. In this respect, Module 4 (General Pedagogy) should be useful since the module is a reference book that provides helpful information for better teaching and learning. CLs and teachers should find the module useful particularly when they know in what area they want to improve teaching and learning of challenging topics.

For example, Good Primary Practices in Module 4 discusses questioning skills, the use of the chalkboard and so on. When CLs and teachers want to improve on questioning skills, they can look them up in the module for some theoretical explanation and examples of questioning skills.

When a discussion on challenging topics seems to require information on methods of teaching, Teaching and Learning Activities in Module 4 might be helpful. It describes some teaching methods such as activity method and the discussion method.

6.3.5. Using Sample Lesson Plans on Challenging Topics

Sample lesson plans on challenging topics are given in modules 5 and 6 for the benefit of teachers. These lesson plans can be examined as samples.

Module 5 comprises samples for challenging topics in Mathematics. Module 6 comprises sample lesson plans for challenging topics in Science. Each module has two types of sample lesson plans, Type A and Type B. Sample lesson plans of Type A have additional infromation and teaching hints to those of Type B. The teaching hints suggest some practical teaching skills and methods relevant to a particular teaching point in the course of a lesson. For example, some questions relevant for achieving the core point are shown.

The CL and teachers can simply use some of the sample lesson plans for their SBI/CBI. They can also develop their own lesson plans for challenging topics using one of the samples as a model.

Once CL and teachers have become familiar with the sample lesson plans and their teaching and learning strategies, it is strongly recommended that CL and teachers start developing their own intiated lesson plans for challenging topics.

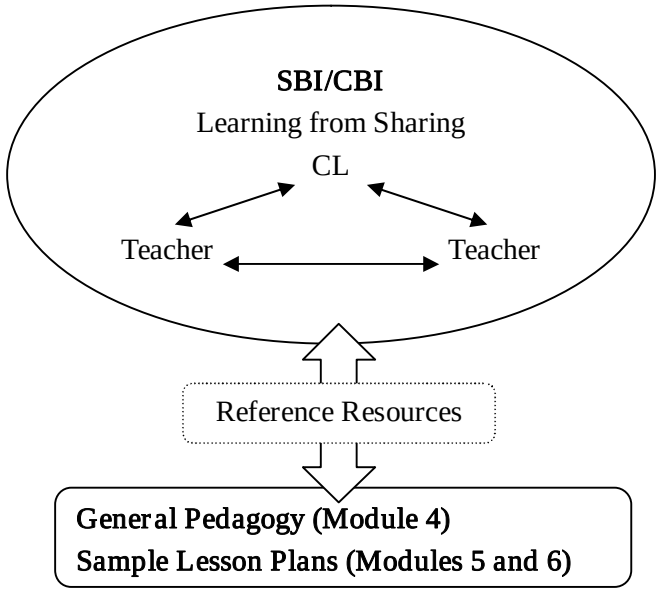


Fig. 18: Using General Pedagogy (Module 4) and Sample Lesson plans (Modules 5 and 6) for challenging topics

6.3.6. Examples of general strategies for teaching challenging topics

Examples of general strageties for **lesson planning**

- Teacher should **prepare adequately** in advance before attempting to teach some of these topics. Where possible, they should consult other colleagues or experts in the field for more reliable and relevant information.
- Consult many curriculum materials for relevant and simple information about the challenging topics you are to teach.
- **Improvise** (Develop) relevant TLMs to make the lessons real and appealing to the pupils.
- Systematic teaching by translating the syllabus into **real life situations**. For examples, it is better to teach flowers when flowers are in season. It is best to teach a lesson on "Water" during the raining season when different types of water can be obtained.
- Organize field trips to help the pupils to learn about the challenging topics **through first-hand experience**.

Examples of general strategies for **lesson delivery**

- **Use pictures and charts** to explain difficult concepts when the concepts are abstract in nature.
- On systematic teaching of concepts, **start from easy topics** before teaching challenging topics.
- **Avoid difficult vocabulary**. The teacher should use simple scientific words. Use the local language to explain certain vocabulary.

Appendix 1: Overview of INSET Programme

1. Overview of the Structure of INSET Programme

The structure of INSET programme comprises three levels, namely National, District and School levels. Each level has specific roles to play for the successful implementation of the programme. Their simplified structure is shown in Fig.19.

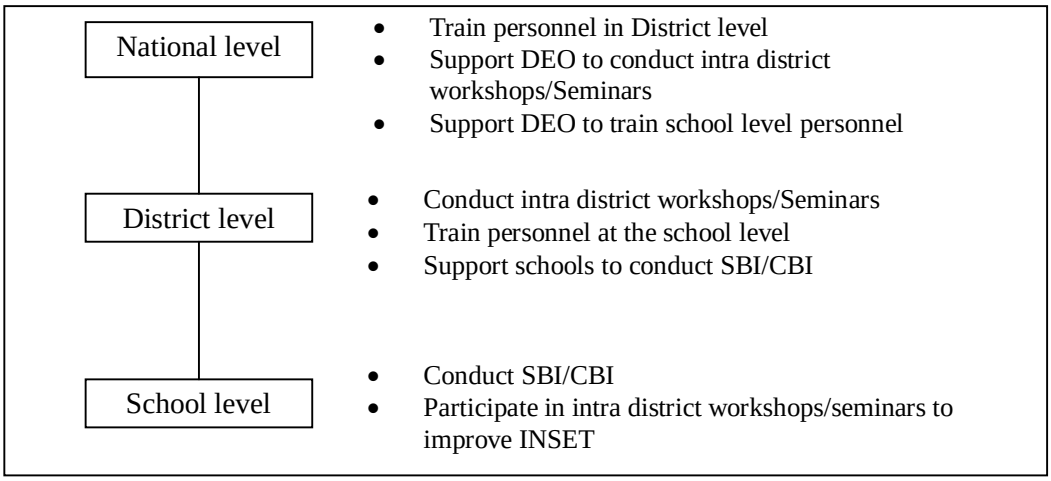


Fig. 19: Structure of INSET Programme

2. Guiding Documents Related to each level

Several documents have been prepared for the implementation of the whole INSET Programme. These are National Guidelines, and INSET Sourcebook which consists of six modules (the number of the modules may be increased in future). These documents provide the guides to implement INSET programme at national, district and school levels. The structure of the documents is shown in Fig.20.

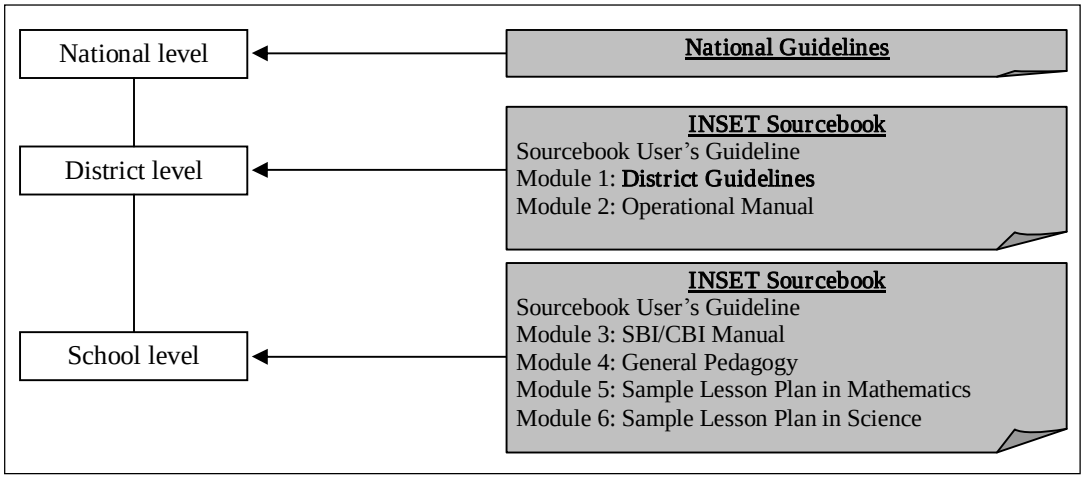


Fig. 20: Structure of guiding documents related to each level

3. Key Players of the INSET Programme

Personnel at each level are divided into two groups; one is responsible for administrative matters and the other is responsible for issues related to the facilitation of the INSET activities. Fig. 21 illustrates the two groups for administrative and facilitation matters at each level.

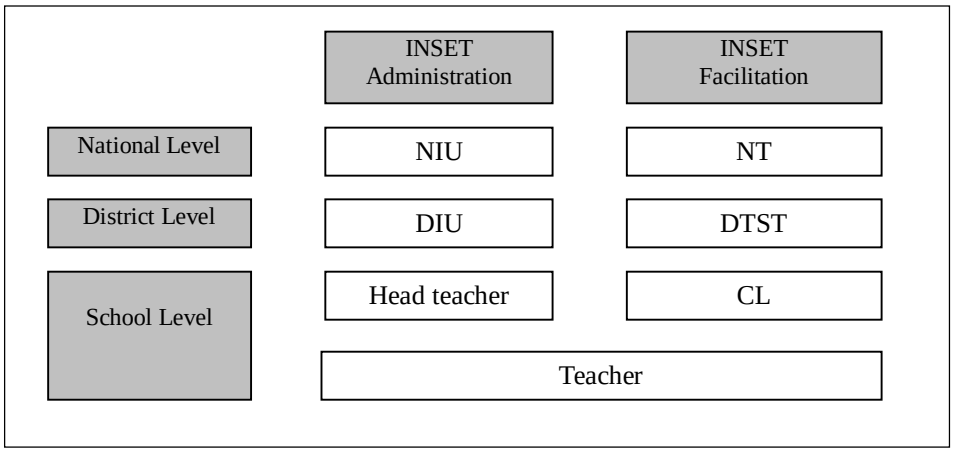


Fig. 21: Personnel and their roles at each level of INSET

For instance, at the national level, the National INSET Unit (NIU) is in charge of administration and the National Trainers (NT) take care of the facilitation of the INSET. At the district level, the District INSET Unit (DIU) is responsible for administration and District Teacher Support Team (DTST) takes care of the facilitation as well. The DIU belongs to District Education Office (DEO). Some of the DTST members also belong to DEO. At the school level, moreover, Head Teacher (HT) and Curriculum Leader (CL) mainly take responsibility of administration and the facilitation respectively.

4. Structure of INSET Programme

To implement INSET successfully, it is necessary to establish structured and standardised communication among the key players of the INSET programme. Fig. 22 shows a structure of such communication channel.

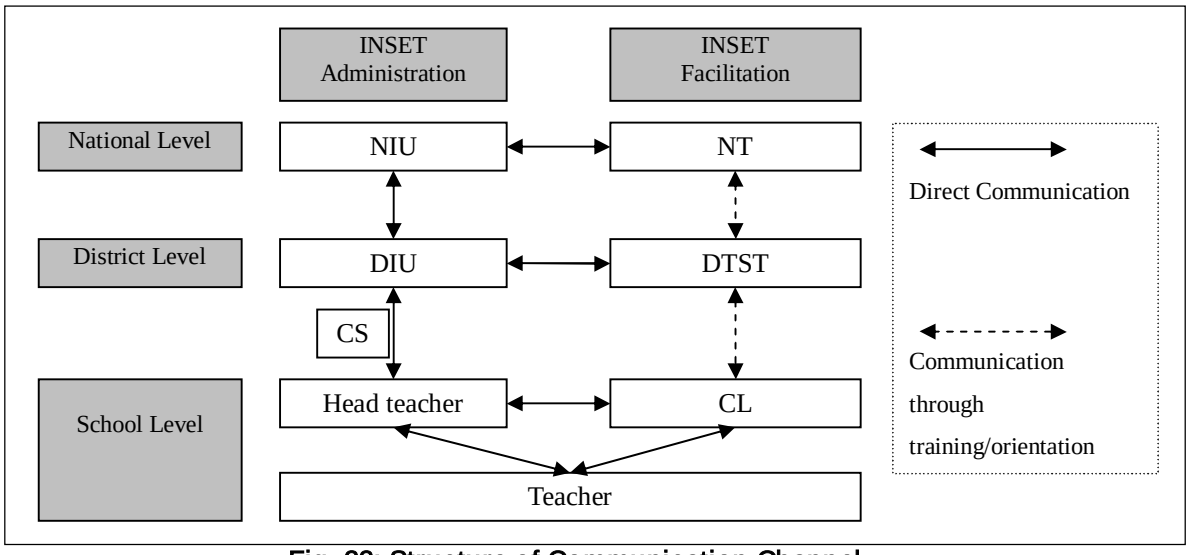


Fig. 22: Structure of Communication Channel

The groups of the personnel described in Fig.21 are the key players of the INSET programme. They give training/orientation to other key players of the INSET programme and they also

receive training/orientation from other key players. For example, National Trainers give training to DTST while CL and HT receive training/orientation activities from DTST. Figure 23 shows the flow of the training/orientation activities among the key players of the INSET programme.

The arrows indicate the directions of the flow of training/orientation activities. Some of the directions are from higher levels to subsequent levels. However, it should be noted that, SBI/CBI at the school level does not have to be this way at all. SBI/CBI places emphasis on collegial learning and sharing where teachers learn from their colleagues, i.e. teachers.

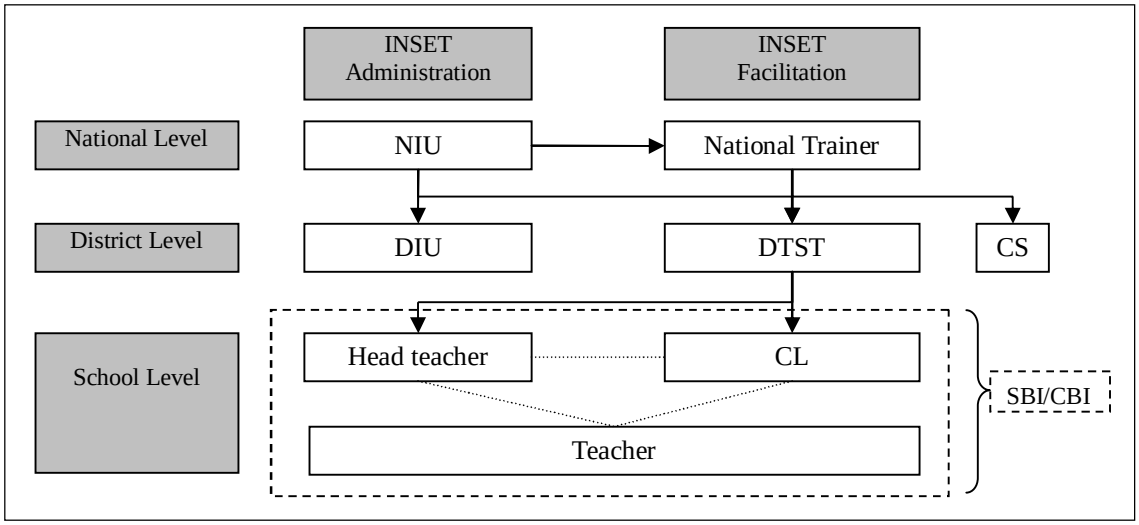


Fig. 23: Flows of training/orientations among the key players of the INSET programme

5. Information Management System

In order to improve INSET programme, there is the need to collect, store, share and utilize the information on the programme among all stakeholders. Well-managed information is easily analysed and shared among the stakeholders, and this leads to a better planning. To manage information effectively, it is important to standardise the procedure and items to be collected, so that all the stakeholders can understand who collects the information and how it is collected.

Information Management System is structured collection and management of relevant information. It is described in Fig. 24. The figure shows that there are two main lines of information-flow in the Information Management System:

1. Flow of information for self-improvement (indicated in dotted arrows)
2. Flow of information for reporting to upper levels (indicated in bold arrows)

The first flow means the utilization of information for self-improvement at the school, district and national levels. Self-improvement involves the process whereby the facilitators will utilize lessons learnt to improve the following programmes within the same levels through analyzing the training/orientation programmes.

For instance, at the district level, we can regulate the planned budget better through analysing the information gathered that are related to all the training/orientation programmes within DEO. We can also make a better arrangement of time schedule and venue for the next year.

The second flow means to report information on the implemented INSET programmes to upper levels. Through reporting the information, the personnel at upper levels can be aware of the programmes at lower levels. If they are aware of that, not only can they give the personnel at the lower levels some feedback in order to improve the following programmes, but can also revise

and enrich the National Guidelines and INSET Sourcebook (District Guidelines) based on the concrete experience of conducting INSET programme.

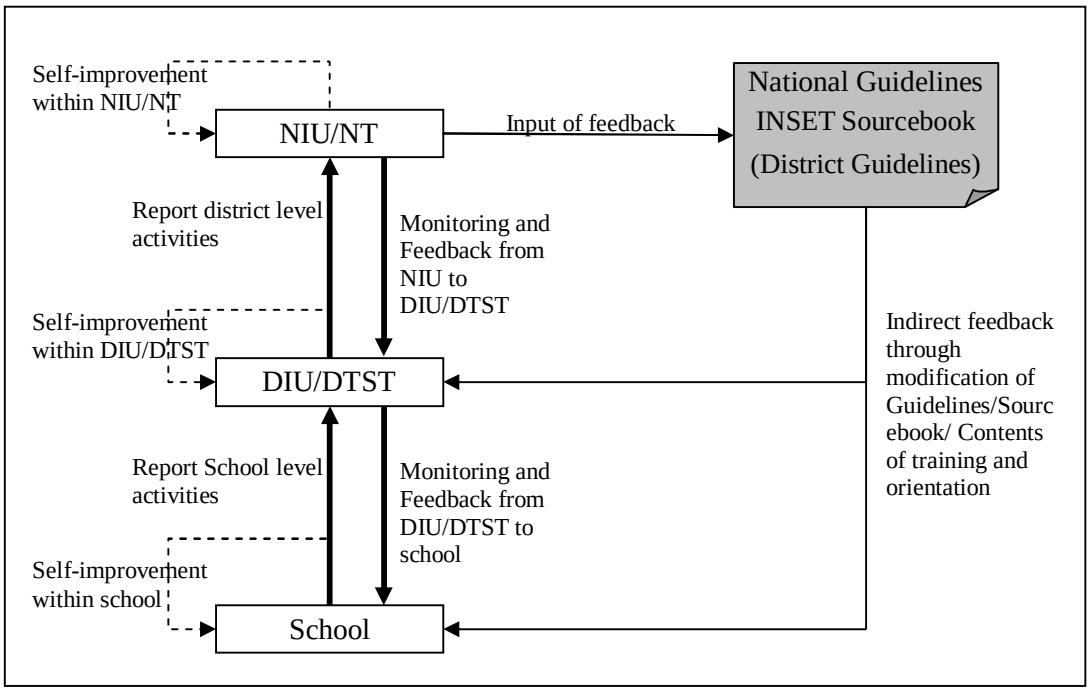


Fig. 24: Information Management System

Appendix 2: Forms for SBI/CBI Activities

List of Forms

Form 1

CL RECOMMENDATION FORM

1. Date: ……

2. Name of School: ……..

3. Basic Information on CL:

Name of Recommended Teacher: ……..……

Age: ……years old

Sex: Male / Female

Certification: ……..……

Teaching Experience: ……...…… years

Interest in Subject Matter: Enough / Not enough

Knowledge of Subjects (Math & Sci): Enough / Not enough

4. Recommendation (in terms of attendance in INSET, instruction skills, leadership skills, motivation and cooperation, etc.):

……
……
……
……
……
……
……
……

……	……
Signature of Headteacher	Signature of DTST who has approved
……	……
Name of Headteacher	Name of DTST

Form 2

SBI/CBI ANNUAL PLAN SHEET

School:..... Academic Year:.....

Term									
Session									
Date									
Types of Activity									
Class/subject									
Topic/sub-topic									
Demonstrator									
No. of Participants									

MATERIALS/ITEMS	UNIT PRICE	QUANTITY									TOTAL COST
Paper											
Felt Pen											
Cardboards											
										TOTAL:	

Form 3

SBI/CBI SESSION PLANNING SHEET

General Information		
School (hosting and invited):	CL (of host school):	
Date/Year/Term:	Time:	Session:
Type of Activity: Lesson Study Peer Teaching TLM Preparation/usage		
Themes of the Session:		
Demonstration Activity		
Demonstrator:	Class:	Subject:
Topic/Sub-Topic:		
Necessary Materials/Items		
TLM Resources:		
Equipment to be provided in the classroom:		
Others (for Pre/post-activity Discussion etc):		
List of Participants (and schools)		

Form 4

SBI/CBI DEMONSTRATION ACTIVITY FORMAT

General Information		
School:	Demonstrator:	
Date/Year/Term:	Time:	Session:
Type of Activity: Demonstration Lesson Peer Teaching TLM Preparation/usage		
Class:	Subject:	
Points on the Demonstration Activity		
Topic/Sub-Topic:		
Rationale for choice of Topic/Sub-Topics:		
Viewpoints from Observers:		
Summary of the Lesson Plan or TLM Plan		
Objectives:		
Teaching/Learning Activities & Materials (in brief):		
Core Points:		
Evaluation/Exercise:		

Note: To be prepared by the demonstrator to submit with the lesson plan to the CL

Form 5-a

ACTIVITY OBSERVATION SHEET (Specific)

School: ..... Date: ..... Time: ..... –

Observer: ..... Demonstrator: .....

Type of the Activity: Demonstration Lesson Peer Teaching TLM Preparation/usage

Class: ..... Subject: .....

Topic/Sub-topic: .....

Objectives of the Activity: .....

Put your comments (Strong Points/Points for Discussion) in terms of the themes for the session, so that the post-activity discussion will be enriched. The themes are supposed to be given by the facilitator of the session in the pre-activity discussion.

Themes for the Session:
Strong Points:
Points for Discussion:
Lessons Learned for Subsequent Teaching and Learning:

Form 5-b

ACTIVITY OBSERVATION SHEET

(based on Performance Standard)

School:..... Date:..... Time:..... –.....
Observer:..... Demonstrator:.....
Class:..... Subject:.....
Type of Activity: Demonstration Lesson Peer Teaching TLM Preparation/usage
Topic/Sub-topic:.....
Objectives of the Lesson:.....

Indicate by ticking (√) in the appropriate box how far the demonstrator has achieved each of the following viewpoints.

(Degree: 1-Not achieved, 2-Minimally achieved, 3-Partially achieved, 4-Fully achieved)

Instructional Planning Skills	1	2	3	4
• Well laid out plans with well coordinated features (clear and '**SMART**' objectives) **S**-Specific, **M**-Measurable, **A**-Achievable, **R**-Relevant, **T**-Time-bound				
• Well stated core points clarifying main skills and/or concepts				
• Logical sequencing of teaching and learning activities				
• Indicates appropriate stages in lesson plan where TLMs are used				
• Provides varied teacher learner activities (e.g. group work, role play etc)				
Teaching Methodology and Delivery	**1**	**2**	**3**	**4**
• Uses language appropriate to the level of pupils				
• Writing on chalkboard is systematically organized				
• Writing on chalkboard is easy to read				
• Chalkboard is used to summarise important or core points of lesson				
• Questioning techniques place emphasis on 'why' and 'how' questions to promote higher order cognitive responses				
• Offers feedback to pupils' responses that promote further or better understanding (does not simply tell pupils their answers are right or wrong)				
• Relevant and appropriate use of TLMs by either teacher or pupils				
• Introduces activities to promote pupils' active participation				
• Uses activities that are related to lesson objectives/core points				
• Uses activities to help pupils understand new concepts				
• Evaluation of pupils closely related to core points/objectives of lesson				
Classroom Organisation and Management	**1**	**2**	**3**	**4**
• Arranges class to suit learning activity (e.g. group work activity in or outside the classroom)				
• Uses appropriate class control measures (e.g. appointment of group leaders, free movement of teacher in class etc.)				

Notice: Please keep a record of your comments at the back of the sheet.

Form 6 (1/2)

Record of Post-Activity Discussion Session

Major Comments from Demonstrator
Comments by Colleague Teachers (based on their Observation Sheets)
Discussion Summary

Discussion Summary (continued)
Comments by Head Teacher
Lessons Learned for Subsequent Teaching and Learning (Participants):
Lessons Learned for Subsequent Teaching and Learning (Demonstrator/CL/HT):

Form 7

SBI/CBI Implementation Summary

School: ..... Date: ..... Time: ..... –

Observer: ..... Demonstrator: .....

Type of the Activity: Demonstration Lesson Peer Teaching TLM Preparation/usage

Class: ..... Subject: .....

Topic/Sub-topic: .....

Objectives of the Activity: .....

1. Questions about activity administration

Was the venue appropriate (capacity and location) to the participants?	Yes ☐	No ☐
If no, please explain the reasons.		
Was the date and time the same as planned?	Yes ☐	No ☐
If no, please explain the reasons.		
Were necessary handouts distributed adequately?	Yes ☐	No ☐
If no, please explain the detail and its reasons.		
Was the number of the participants as planned?	Yes ☐	No ☐
If no, what are the reasons of their absence?		

2. Implementation Challenges

Please describe implementation challenges of SBI/CBI activity.

3. Record of Post-Activity Discussion Session

Please attach Record of Post-Activity Discussion Session.

Form 8

SBI/CBI Data Sheet

School:	District:

1. Activity Information

SBI ☐ CBI ☐	Class:
Number of the Participants / Total Number of Teachers:	
Date:	Time:
Type of Activity (Tick One) : ☐Lesson Study ☐ Peer Teaching ☐TLM Preparation/Usage	
Subject (Tick One): ☐Science ☐Maths ☐English ☐Other (specify):	
Name of Demonstrator:	
Topic/Sub-Topic:	
Objectives /Purpose of the Session:	
Names of the Participants:	

2. Budget

Items	Budget	Actual Amount Spent	Amount Left
Total Amount			

Name: _____

Form A

SCHOOL CAPITATION GRANTS

SCHOOL PERFORMANCE IMPROVEMENT PLAN

DISTRICT:.....

NAME OF SCHOOL:.....

COMPONENT/TARGET	ACTION TO BE TAKEN	WHO IS RESPONSIBLE	RESOURCES NEEDED	TIME FRAME	WHO MONITORS
1 IMPROVING ACCESS i enrolment drive ii support for the needy					
2 PROVISION OF TEACHING AND LEARNING MATERIALS Adequate textbooks esp. English and Maths, cardboards, felt pens, clock, strings, crayons etc					
3 SCHOOL MANAGEMENT i update site plan and inventory for school ii provision of stationery iii effective SMC/PTA iv effective administration v maintaining discipline					
4 COMMUNITY AND SCHOOL RELATIONSHIP i organise school visits ii organise communal labour iii effective PTA meetings iv provide welfare service to teachers					
5 SCHOOL FACILITIES i provide desks to school ii rehabilitate classroom iii provide toilet and urinal to school iv provide equipment for games					

Form B

SCHOOL CAPITATION GRANTS

REQUEST FORM

Name of School:

Based on the School Performance Improvement Plan, I/we request for the release of funds for the performance of the following activity/(ies):

Activity:.....

.....

.....

Amount:.....

Name:.....

Signature:.....

Approval:

Head teacher:.....

SMC Chairman:.....

Form C

SCHOOL CAPITATION GRANTS

ADVANCE FORM

DATE No.....

NAME OF SCHOOL.....

In consideration of your application for the release of funds for the performance of.....

you are hereby advanced an amount of.....

as per cheque No..... for same.

Kindly account for the money latest.....

.....	.....
Signature of Recipient	Signature of Headteacher
.....	.....
Name of Recipient	Name of Headteacher

Form D

SCHOOL CAPITATION GRANTS

ACCOUNTING FOR ADVANCE FORM

DATE ADVANCE FORM REF. NO

Kindly find attached:

Receipts totalling ....

honour certificates totalling ....

cash amounting to ....

in full discharge of the Advance as per the above reference number.

....

Signature of Officer Approved by Headteacher

....

Name of Officer Name of Headteacher

Form E

SCHOOL CAPITATION GRANTS

HONOUR CERTIFICATE

I .....in the interest of the Service purchased the items listed below for which no official receipts were obtainable.

DATE	DETAILS OF ITEMS	QTY	UNIT PRICE	TOTAL COST
		TOTAL		

Totalling: .....

.....

.....

..... Approved by .....

TEACHER/OFFICER VOUCHING Headteacher

Form F

SCHOOL CAPITATION GRANTS

CASH BOOK

DATE	DETAILS	REC/CB NO	INCOME	PAYMENT	BALANCE	PAYMENT ANALYSIS							
			BANK	BANK	BANK	STATIONERY	CULTURE	SPORTS	T&L MATS	MINOR REPAIRS	T&T	NEEDY PUPILS	IN-SERVICE
	TOTAL												

Form G

SCHOOL CAPITATION GRANTS

MONTHLY EXPENDITURE RETURNS

School:

Reporting Period: Term:.....

Month of:

Date of Report:

1. Amount received from District to date for Term.

Tranche 1 .....

Tranche 2 .....

Tranche 1 .....

Total: .....

2. How was the money spent: indicate each activity and budget cost involved as stated in your SPIP, as well as actual costs.

No	Description of Activity/Activities	Budget	Actual Amount Spent	Amount Left
1 2 3 4 5 6				
	Total Amount			

I certify that I have checked this report against all presented receipts

.....

Signature of Headteacher

.....

Attach copy of bank statement for the period

Form H

SCHOOL CAPITATION GRANTS

ACTIVITY COMPLETION REPORT

1 Name of School: .....

2 Target Group: .....

3 Activity: .....

4 Location, Duration and Time of Activity

Venue	Start Date	Finish Date	No of Days

5 Budget

Original Estimates	Total amount Spent	Balance

6 What was the overall assessment of the activity completed? Tick where appropriate.

Excellent	Very Good	Fair	Poor

7 Comments: .....

.....

.....

8 What problems did you encounter in implementing this activity?

.....

.....

Any other comments?

eg: what did you learn from doing this activity? What will be changed if this activity is to be done again? What follow up will you do for this activity?

.....

.....

.....

Signature of Headteacher

Form I

SCHOOL CAPITATION GRANTS

TERMLY STATUS REPORT

1 Name of School: .....

2 Term: FROM: ..... TO: .....

3 Status of Planned Activities

No	List of Activities in SPIP	Status			
		completed	On-going	Not-started	Suspended
1 2 3 4 5 6					

4 What planned activities were not covered? .....

.....

.....

.....

Give reasons: .....

.....

.....

.....

.....

.....

Signature of Headteacher

Module 4: General Pedagogy

Users:

Teachers and CLs for SBI, DTST for CL Sourcebook Training, National Trainers for DTST Training

Objectives of this Module:

Module 4 provides the users with reference materials in terms of general pedagogy. The module offers general teaching skills and methods as well as subject-oriented teaching skills and methods. The module uses several examples of the skills and methods for the sake of explanation; however, those who need more practical examples are advised to refer to Modules 5 and 6, which elaborate how to use some of those skills and methods in actual lessons.

It is recommended that the users refer to some specific sections of Module 4 when they are involved in SBI/CBI, CL Sourcebook Training and DTST Training. For example, during SBI/CBI, Module 4 can help a CL to form a focus or a theme of the discussion and demonstration activity. Besides, when dealing with challenging topics, CLs and teachers can search for relevant information that can assist them in developing a better lesson plan for the topic.

Module 4 consists of 6 chapters as shown below:

1. Study of the Primary School Curriculum Materials
2. Good Primary Practices
3. Teaching and Learning Activities
4. Lesson Plan
5. Assessment
6. English as a Tool to Support Understanding of other Subjects

Module 4 has been developed with reference to:

- Teaching syllabus for Mathematics (primary school), by MOE
- Teaching syllabus for Integrated Science (primary 4-6), by MOE
- Handbook on the teaching of Mathematics in primary schools, GES
- Handbook on the teaching of Science and Environmental Studies in primary schools, GES
- Handbook on the teaching of English Language in primary schools, GES
- Handbook on lesson notes preparation and teaching and learning materials in primary schools, GES
- Manual for the teaching of Science and Mathematics in basic schools, GES/JICA

Table of Contents:

Version:	1.00

1. Study of the Primary School Curriculum Materials

Introduction

Successful teaching and learning to a large extent emanates from careful planning and preparation. Before this can be done, the teacher must be fully aware of the need to familiarize himself/herself with the requisite curriculum materials. The curriculum of a school is the structured and controlled total learning experience under the guidance of a school.

What are curriculum materials?

Curriculum materials are the documents or reference materials available for teachers for effective lesson planning, preparation and delivery. These materials contain vital information, which directs the teacher to prepare lesson plans and to teach effectively. They are:

- the syllabus
- teachers' manual/guide
- pupils' textbook
- pupils' workbook and
- other relevant external reference materials

The Syllabus

It is a document that contains all the topics for a course or teaching of a particular subject. Each subject taught in the basic school has its own syllabus. A syllabus is planned to include the work to be taught for a whole year.

The syllabus contains other important information such as:

- General Objectives/Goals
- Year and Units for Mathematics
- Section and Units for Science
- Specific Objectives
- Content
- Teaching/learning Activities
- Evaluation

Table 1: Information Contained in the Syllabus

Headings/Items	Explanation
General Objectives/Goals	They are a summary of the specific objectives of the various units contained in that section.
Sections and units	These are divisions in the syllabus or the way the syllabus has been planned year by year. Each year's work has been divided into sections.
Specific Objectives	These state the knowledge; skills and attitudes that the pupil is expected to acquire or develop in one or more lessons. They are stated in measurable/behavioural terms. They indicate what the pupil will be able to do after instruction and learning in the unit.
Content	The content presents a selected body of core ideas that will be needed in teaching or achieving particular specific objectives. They are selected to bring out the basic ideas, concepts, knowledge, principles and skills, including generic skills and attitudes relevant to particular subjects at the primary level.
Teaching and Learning Activities	These are activities, which indicate the extent to which the various aspects of each topic are expected to be covered at any particular stage in the lesson delivery. They include suggestions for the methods that could be employed to promote good or best primary practices. The teaching and learning activities are outlined to ensure maximum pupils' participation in the lesson. The teacher is encouraged to re-order the suggested teaching and learning activities and also add to them where necessary in order to achieve optimum pupil learning.
Evaluation	The evaluation is expected to provide information to help the teacher to decide whether the objectives of the lesson have been achieved. It also seeks to find out whether the methods employed are sufficient enough to achieve the objectives set out for the lesson and to identify any defects in the learning situation. It deals with exercises to find out the extent to which the lesson or each unit has been understood.

Teachers ' Manual/Handbook

The handbook attempts to present the units in the same sequence as found in the syllabus. It contains suggestions for the activities and teaching/learning materials that could be used to teach the various aspects of each unit. It may also give some background knowledge for each unit. It contains answers to questions in the pupils' textbook.

Pupils' textbook

The pupils' textbook gives reliable support material for use by the teacher in terms of what is relevant at the level of the pupils. It attempts to match the exercises for the pupils with the sequence of the materials in the syllabus.

Pupils' workbook

It supplements and extends the material presented in the pupils' textbook.

It provides exercises and activities in a lively and interesting way. It also assesses pupils'

knowledge and understanding of concepts, skills and processes.

Other relevant external sources of information

These include all other sources of information that are relevant to the topic to be treated by the teacher and which may make the lesson more understandable to both the teacher and the pupils.

2. Good Primary Practices

2.1. Good Practices （General）

There are certain basic good practices that teachers need to acquire to make their teaching and learning activities more effective. These practices in teaching and learning are termed "Good Primary Practices".

2.1.1. Pre-delivery Activities (Good Primary Practices Before a Lesson)

Pre-delivery activities are all the activities that a teacher undertakes before the actual lesson delivery.

- Effective use of the three basic curriculum materials namely the syllabus, pupils' textbooks and teacher's guide as well as other reference books.
- Selecting appropriate Relevant Previous Knowledge (R.P.K.) for the topic.
- Statement of specific objectives which are achievable, measurable and observable and suit the level of the class.
- Selection of teaching and learning activities that will help the pupils to develop the necessary process skills and acquire scientific knowledge (core points).
- Preparation of a good lesson plan.

2.1.2. Delivery Activities (Good Primary Practices during a Lesson)

Delivery activities are all the activities which a teacher and the pupils engage in during the presentation of the lesson.

- Very good introduction to link the topic with the R.P.K.
- The use of activity method of teaching together with other methods like discussion, demonstration, etc, to achieve the stated objectives and to derive the core ideas/facts. ·
- Effective use of questioning skills, i.e. using probing questions, distributing questions evenly, etc.
- Being sensitive to gender issues during lesson delivery.
- Sequencing of core points during general class discussion on the activities which were performed by the pupils.
- Very Clear and audible voice together with legible handwriting on the chalkboard.
- Effective use of chalkboard, which helps pupils to follow the lesson sequence and the summarised lesson content.

2.1.3. Post-delivery Activities (Good Primary Practices after a Lesson)

Post-delivery activities are all the activities which a teacher and the pupils undertake after the presentation of the lesson. Normally, pupils are assessed during the post-delivery activities.

- Evaluation of the lesson, which can take the form of:
    1. Drawing and labelling of objects,
    2. Doing a short writing or oral exercise based on the activities,

3. Writing chalkboard summary.

- Assigning a project work.
- Discussion with pupils after they have written an assignment.

2.2. Good Practices (Mathematics)

The general observation is that at the primary level in Ghana, Mathematics lessons lack the necessary attractions to make the subject meaningful and appealing to our pupils. A good practice in teaching Mathematics at that level will be a child-centred activity which involves a variety of activities to enable the pupils to like and learn the subject as they DO and TALK Mathematics. Such practice relates Mathematics teaching and learning to our daily life activities and makes pupils' learning more fun.

The following aspects are helpful to the realisation of such good practices in teaching Mathematics:

a) Good Communication Skills

The use of simple language is needed to help pupils to understand so they can respond to whatever is being taught. For example, the product of 6 and 4 to a lower class in a primary school should rather be: Multiply 6 and 4. In the case of teaching a Mathematical Concept of greater than (>) to a P1 class, it will be better to use bigger than before the concept of greater than is used. Also, the teacher's voice must be clear and loud enough.

b) Teaching from Concrete, through Semi-concrete to Abstract

In teaching pupils to develop a concept, start with real or concrete objects, follow up with diagrams/charts or sketches and end with symbols. In counting at the early stages, use counters such as bottle tops, then follow up with pictures of groups and end with numerals (symbols).

c) Word/story Problems should be Related to Pupils' Environment

We need to tap pupils' P.K. for effective teaching and learning. It is therefore, necessary to relate word/story problems to the pupils' environment. For example, a problem in a farming community could be related to foodstuffs. In sum, the pupils should be exposed to things they are familiar with.

d) The Use of Correct Mathematical Language/Terms

Mathematics is used as a means of communication and as such language/terms are associated with it. These can only be acquired through usage. Therefore from P1 the correct Mathematical language/terms have to be used, e.g. $\frac{1}{2}$ as one half, 0 as zero, $\frac{5}{10}$, i.e. five tenths, $\frac{2}{3}$ as two thirds, 106 is read, one hundred and six.

e) The Use of Mathematical Games/Puzzles

Mathematical games portray mathematical concepts. They allow teachers to employ the Play/Activity method of teaching Mathematics. They help to consolidate lessons

taught. Examples of mathematical games include: Ludo, Oware, Dominos, Fraction Game, etc. Puzzles encourage pupils to reason, analyse and enjoy Mathematics at the same time.

f) Assignments for Evaluation

The assignments are the exercises/project/homework given out to pupils to do in order to find out whether or not they have understood a lesson delivered. This is also to ascertain whether the teacher's methodology was appropriate or not. Giving assignments for evaluation is an important tool for the teacher to assess the effectiveness of the lesson taught. Teachers are therefore to be cautious of how to select test items.

g) Guiding Pupils to Make Corrections and Marking them

It is a remedial process put in place to help the pupil overcome learning difficulties and to be on the right learning track. Through corrections, the teacher could determine whether the pupil has fully understood the concept or not. When a pupil is able to solve a problem in a second attempt, he feels motivated and confident to attempt a harder task. It is important therefore for the teacher to go about correcting exercises cautiously so that the pupil is able to get an exercise right, at least, on the second attempt.

GENERIC SKILLS: PRIMARY 1 – GROUPS OF OBJECTS

Table 2: Skill Development in Primary 1

Generic Skills	Activity	Example
Listening	Playing the game 'I Spy'	I am thinking of a group of objects with wheels. What is it?
Speaking	Identifying groups of objects	Mention the name of a given group of objects
Writing	Drawing groups of objects	Draw a group of squares
Reading	Identifying members in a group	Read the name on the label for a given group of objects
Talking	Comparing of objects in a group	Pupils compare the lengths of two objects to tell which is short and which is long
Showing	Ordering of objects	Pupils arrange groups of sticks from the shortest to the longest and show to the class
Reporting	Comparing objects	Pupils compare any two groups of objects and report on how to show that one is more or less than the other
Observing	Matching objects	Pupils observe how objects are matched using one-to-one matching
Investigating, Thinking and Problem solving	Playing the game 'I Spy'	I am thinking of a group of objects that fly but they are not living things. What are they?
Playing	Playing the game 'I Spy'	In two groups, pupils pose problems to each other about groups of objects, and tell the winning group finally
Making	Sorting objects	Pupils group objects according to shape or colour.
Doing	Ordering groups of objects	Pupils group objects according to size

2.3. Good Practices (Science)

A Science and Environmental Studies teacher can make his/her lessons interesting and child-centred when certain basic skills like observation, manipulation, measurement and classification of objects are projected in the teaching and learning activities. Pupils as we know, do participate actively in a lesson when they manipulate objects to find out things or facts for themselves. The relevant basic skills which pupils use to acquire facts and knowledge and also to solve their problems are called Generic/Process Skills. In this section, we shall learn more about the skill.

2.3.1. Definition of Science

Examples of definition of Science and Environmental Studies are shown below.

- A body of knowledge which can be communicated to others and which can be verified by anyone willing to make the effort to do so.
- A way of learning which involves first-hand experience, inquiry, problem solving, interpretation and communication of findings and the development of attitudes which promote this way of working.
- Exploring the environment, observing things and solving problems.

The aforementioned definitions are among many other definitions given by scientists but there are only two major views on all these definitions of Science and Environmental Studies. These views consider science as a body of knowledge (product) and as a means or process of generating knowledge (process). As we know, scientists carry out studies of the environment or investigate the natural phenomena through identifying a problem, observing, experimenting and communicating findings. They make use of certain attitudes like objectivity and open-mindedness when collecting and interpreting information. **Process of Science** is the procedure scientists use to carry out a study of the environment.

2.3.2. Generic/Process Skills and Science

It is very important to use a variety of Generic/Process skills in a lesson. The following table shows briefly Process Skills in Science and their meanings.

Table 3: Generic/Process Skills in Science and their Meanings

Generic/Process skills	Explanation/Meaning
Planning	Defining the problem and thinking of ways to solve it through experimentation, or some structured investigation.
Observing	It involves the use of the senses to take in information.
Classifying	Placing a collection of objects or events in categories based on similar characteristics.
Experimenting/fair testing	Interacting with materials to find out things for yourself or managing the factors that may influence a situation or event so that the effect of a given factor may be learned.
Raising questions	Asking a variety of questions through words or actions; asking questions which can be answered through scientific investigations/experimentation.

Generic/Process skills	Explanation/Meaning
Measuring	Using measuring instruments correctly and with appropriate precision as required by the investigation, and being able to compute results from measurements taken.
Manipulating	Skilful handling of objects and tools in accomplishing a task.
Predicting	Forecasting what future observations will be on the basis of previous information, which distinguishes it from guessing.
Hypothesising	Suggesting reasons for events or phenomena, which can be tested scientifically. It involves applying concepts and ideas from previous experience.
Interpreting data	Giving meaning to information gathered.
Inferring	Drawing conclusion based on trends and patterns observed or on one's previous experience.
Generalising	Extending the conclusion of an experiment to other similar situations; being able to predict possible solutions to similar problems based on the results of a previous experiment.
Evaluating	Assessing the results of the experiment and finding conclusions or inferring conclusions from the experiment; determine whether results confirm one's prior prediction or not. Making value judgment based on assessment result.
Communicating	Being able to present information so that it can be understood by others, being able to understand information from others presented in various forms using graphs, charts, prose, written instructions diagrams, pictorial and oral representation.

It is very important for teachers to put their knowledge of Process Skills into practice. That means teachers apply Process Skills in lessons. One of the effective ways to do so is to use questions that are related to Process Skills. When these questions are well planned, they are very powerful to foster pupils' process skills. Table 4 shows some examples of questions related to Process Skills. They are categorized into four stages, planning, experimenting, assessing and communicating.

Table 4: Application of Generic/Process Skills through Questioning

Generic/Process Skills	Generic/Process Skills through Questioning
Planning	
Resources	What will you need?
Predicting	What is the key idea and what is likely to happen?
Hypothesising	Why will it happen?
Experimenting	
Observing	What do you see, hear, smell and feel?
Measuring	What will you measure?
Handling Apparatus	What will you change to make a fair test?
Recording (Writing)	How will you record the results?
Assessing	
Evaluating	What have you found out?
Discussing	How do you relate the outcomes?
Generalising	What might be said about the key ideas?

Communicating Speaking (Talking) Writing or drawing diagrams/posters Listening	 Will you describe the experiment orally? Will you write a clear report about the data? How will you communicate to others and also receive information from others?

Although it is not practically possible for teachers to carry out an experiment in a lesson on a daily basis, teachers should make efforts to maximize pupils' opportunities to see/do an experiment. In an experiment, Generic/Process Skills can be effectively presented. Table 5 presents application of Generic/Process Skills during experiments in a particular lesson. It shows the relationship between Generic/Process Skills and activities in the experiments.

Table 5: Application of Generic/Process Skills during an Experiment (Topic: Electrical Circuits, Class: Primary 6)

Generic/Process Skills	Description of Activity
Planning (Resources)	Wire, dry cells, bulbs, keys
Predicting	Dry cells in a series circuit will produce brighter light than dry cells in a parallel circuit.
Hypothesising	Dry cells in a series circuit produce brighter light.
Fair Testing/ Experimenting	A Series circuit and a parallel circuit are constructed using two dry cells and a bulb in each circuit.
Observing	The series circuit has the dry cell arranged in a row while in the parallel circuit the cells are arranged side by side.
Manipulating	Two dry cells and a bulb are connected by pieces of copper wire to make a series and a parallel circuit.
Measuring	The intensity of the light is measured by using a number of sheets of paper to block the light rays from each of the bulbs.
Recording	Draw each circuit. The brightness of the bulbs is recorded by tabulating the number of sheets of paper that the light rays from each bulb passed through.
Interpreting data	A series circuit produces brighter light than a parallel circuit. The light from a series circuit was able to penetrate more sheets of paper than light from a parallel circuit.
Generalising	Dry cells in a series circuit produce brighter light than cells in a parallel circuit.
Communicating	Cells give more power when they are arranged in series than when they are arranged in a parallel circuit. In a series circuit, dry cells are arranged in a row. In a parallel circuit, cells are arranged side by side.

2.4. Managing Special Classes

There are certain problems/challenges facing classroom teachers that hinder effective teaching and learning in primary schools. The challenges include large class size, small class size, extremely high ability group, low ability group, classes without curriculum materials and classes without furniture. Using effective class management techniques can solve these challenges. This section discusses how to manage special classes with those challenges.

2.4.1. Special Classes and their Features

Special classes are the classes that are quite different from normal or usual classes.

Their anomalous nature is characterised by the challenges enumerated above and other additional features summarised below:

- Large class size (A class with 35 pupils is the norm and a class with more than 40 can be regarded as large class)
- Small class size
- Extremely high ability group
- Extremely low ability group
- Multi-grade classes
- Classes without curriculum materials, i.e. no syllabuses, no textbooks, no teacher's manual
- Classes without tables and chairs for the pupils to sit comfortably to do exercises
- Classes held under trees, sheds and in uncompleted buildings

2.4.2. Large Class Teaching

Features of Large Classes

Due to expanding enrolment of the primary schools, managing large classes is now one of the most important skills primary school teachers need to employ.

For successful large class teaching, it is necessary to understand the features of large classes. The following are some of the typical features of large class teaching.

- There are often various learning backgrounds.
- Extra time and effort are needed for class activities.
- Teacher's speech might not be clearly heard by pupils at the back of the class.
- Pupils tend to be more passive.
- Pupils can easily hide themselves among others.
- It is more difficult to give individual attention, care and advice to pupils.
- Amount of TLMs and working space might be insufficient.
- Time pupils spend on activities decreases.

Strategies for Large Class Teaching

Although large class teaching can be more difficult than normal class teaching, teachers must provide the best possible learning environment. The following suggests some teaching strategies that can minimise difficulties and challenges that teachers often face in large classes.

Station work: Pupils move around a series of stations (i.e. a number of desks set up in different locations in the classroom) that offer different tasks. Because the stations have brief instructions, pupils can carry out learning activities individually. The learning activities can be simple experiments, exercises, and reading tasks.

Small group work: Pupils work on a task in small groups. Pupils can develop ownership of the task and responsibility for their own learning.

Peer evaluation: For effective pupil assessment, the teacher can use peer evaluation. For example, one pupil is active and the other observes so as to assess him/her.

Peer teaching: Pupils help each other to learn, often showing leadership skills. For instance, a group of pupils assist other groups in learning giving advice and comments. In this way, pupils learn from one another. Pupils who receive comments can ask questions that they are normally hesitant to ask their teachers. On the other hand, pupils who give comments can develop their understanding of the topics through the process of explaining to others.

An example of a case of managing large classes is presented in the following:

A teacher can handle or control a large class by first and foremost being able to know his or her own pupils at the following levels.

- Extremely high level,
- Extremely low level,
- Middle ability.

As the teacher gets to know pupils of extremely low ability levels, he or she will also concentrate on them by giving them direct instructions as others are also occupied with different tasks. For instance, as the middle ability groups are engaged in cumulative review, the extremely high ability group will be doing a greater task of practising the skills that are yet to be introduced to the class. With this approach, the teacher will succeed by engaging all the ability levels as he or she goes round to supervise or serve as a co-learner. This can be simplified as shown in Table 6.

Table 6: Example of a Time Table for Large Classes

	Monday			Tuesday	
Group	8:00 - 8:20	8:20 – 8:40	8:40 – 9:00	8:00 – 8:20	8:20 – 8:40
A (Extremely low ability)	Direct Instruction (New Skills)	Practice (Newly-learned Skills)	Cumulative Review (Skill from the Previous Lesson)	Direct Instruction (New Skills)	Practice (Newly-learned Skills)
B (Middle ability)	Cumulative Review (Skills from the Previous Lesson)	Direct Instruction (New Skill)	Practice (Newly-learned Skills)	Cumulative Review (Skills from the Previous Lesson)	Direct Instruction (New Skills)
C (Extremely high ability)	Practice (Newly-learned Skills)	Cumulative Review (Skills from the Previous Lesson)	Direct Instruction (New Skills)	Practice (Newly-learned Skills)	Cumulative Review (Skills from Previous Lesson)

Note: A - is the group the teacher has recognized to be extremely low. B - Middle ability group. C - Extremely high ability group

Again, from Table 6, as the teacher spends 20 minutes for Group A on direct instruction, B and C will then be engaged. After the 20 minutes, A will be practising a new skill and the teacher gives direct instruction to B and so on and so forth. The same table can be used for multi-grade classes. In this case, A will stand for one of the classes that has been combined with the other class(es). B will stand for the other class that A has been combined with. However, the teacher should consider the following points for effective group work:

- Very low ability classes need individual attention as an appropriate approach for teaching the pupils in these classes.
- When pupils are grouped according to similarities in their learning needs or ability levels, it is said to be homogeneous. For example, when all the members of the extremely high ability level are in one group, that will be a homogeneous group. However, middle ability groups fall under heterogeneous grouping.
- It is very important that a teacher makes a conscious effort to maintain a reasonable balance between homogeneous and heterogeneous grouping.
- Too much homogeneous grouping will promote labelling, i.e. "slow learners" and "smart pupils".
- Train the extremely high ability group to help their classmates or provide simple tutorial/remedial help to other groups of classmates.
- Give very clear instructions and agree on rules on how the “tutor” and “tutee(s)”/”learners” should work together. (i.e. Tutors need to respect learners, etc.)
- Provide the “tutor” and “tutees” with the materials they need for a successful peer tutoring activity. (i.e. Worksheets, flip charts and red pens for tutors, etc.)

Here are some things you can do to ensure that group learning is productive and not just "busy work". Establish simple rules of acceptable behaviour of pupils for everybody to observe, such as:

- How to work together on a group assignment, i.e. how to be a good leader and how to be a good member of the group.
- How to talk softly without disturbing others during group work.
- How to take turns and how to wait for one's turn.

2.4.3. Multi-grade Teaching

Multi-grade teaching (MGT) is also known as multiple-class teaching. It involves the combination of two or more classes in selected schools. MGT may be adopted when:

Class enrolments are low.

- This situation arises when schools are built in catchment areas where the enrolment is low. Two or more classes are then combined to be taught by one teacher whiles the other teachers are re-deployed to other needy schools.

Teachers in the schools are few.

- This may be the case in rural areas where some basic schools may not have their full complement of teachers.

Some Characteristics of Pupils in Multi-grade Classes (MGCs)

- They have different intellectual backgrounds.
- They have different socio-economic backgrounds.
- They have different interests.

- Their previous experiences are different.
- They have different educational needs.
- They may prefer different learning approaches.

Types of MGT

Single-class cases of MGT

- There can be **single-class cases of MGT** in which case two classes (e.g. P5 and P6) are combined to be taught with the same lesson plans. The lessons are however to be based on the P6 scheme of work/syllabus and time-table. It must be noted that adopting this approach will slow down the progress of the higher class. On the other hand, the lower class will encounter problems in understanding the lessons since it lacks the appropriate background/ previous knowledge.

Separate-class cases of MGT

- There can also be **separate-class cases of MGT** teaching. Teaching focuses on the scheme of work/syllabus for each class. The pupils may be in the same room (in the case of school with low enrolment) or in different rooms (in the case of schools with normal class sizes but few teachers). If this teaching approach is adopted, then as much as possible there should be separate black/chalkboards if the lessons take place in the same room. This teaching approach enables each class to proceed at its own pace since the time-tables are different. Some difficulties may arise in that class. For example, supervision will not be effective. The teacher will also be overworked.

The combined Approach

- In this approach some lessons are taught differently while others are combined.

Time-tabling and teaching guidelines

Based on the practical experiences of some teachers and educationalists, the following suggestions are made for the effective time-tabling of combined class lessons.

- Where possible, lessons that require little or no previous knowledge/specific background knowledge (e.g. P.E., environmental studies, etc) should be combined.
- When separate lessons are organized, the time-table should be such that while one class is taking a lesson that requires maximum supervision (e.g. lessons that involve the use of fire, sharp objects, etc.) the other class can be taken through a lesson that requires minimum supervision (e.g. expression work, story-telling, etc).
- As much as possible Mathematics and Science should be taught when the pupils are fresh and active. This should be reflected on the time-table.
- As much as possible, the syllabus/scheme of work for Science, Mathematics and Language should be followed separately for each class. This should also be reflected on the time-table.
- Non-examinable subjects (e.g. story-telling, gardening, etc.) may be excluded from the time-table in pressing situations. They should however be re-inserted when the situation improves.
- New Science, Mathematics and English topics should be taught on different days.
- On the whole the ages and mental abilities of the pupils should be considered in the preparation of the time-table.
- When necessary, subjects should be re-arranged on the time-table to ensure effective supervision.

Steps to Ensure Effective Multi-Grade Teaching

Teaching pupils in MGCs requires special techniques and skills. These are quite apart from the general teaching approaches teachers are taught while under training. This is because MGT is a challenging task. It can however be done with adequate preparation. The following points may be helpful in the organization of effective lessons in multi-grade classes.

- Where possible only pupils in adjacent classes should be combined.
- To avoid confusion, assign the various groups to specific portions of the classroom where appropriate. (This will not apply where the pupils are in different classrooms).
- Give clear instructions on how certain activities (e.g. seating, collection of materials, group work etc.) are to be performed. Routinise such activities so that they can be performed without detailed instructions.
- Through quizzes and question and answer sessions, determine the levels of understanding of various groups.
- Ensure that the lessons are appropriate to each group's level of mental development.
- Reinforce the pupils' responses (i.e. by question and answer sessions).
- Assess the pupils' progress as the lessons proceed.
- When appropriate, change the teaching approaches (e.g. group work, demonstrations, etc.)
- The normal school time-table should be modified to indicate the lessons to be organized for each group.
- Keep the various groups profitably engaged at all times on different tasks (e.g. seatwork, group work, etc.). Seatwork refers to any work the teacher assigns to the pupils to be completed in class. This is different from take-home assignments (homework) the teacher gives to the pupils for submission in the course of the week.

MGC teachers can best do this by being proactive (but not reactive) in their teaching task. To be proactive implies to anticipate a problem/challenge and design or think of an intervention in advance. For example, the lesson on the properties of air requires the pupils to make two coalpot fires. The teacher can anticipate what the pupils are likely to do with the materials (i.e. matches, kerosene, etc) that are used to make the fire. He/she can then issue appropriate interactions (eg. ask the more mature pupils to light the fire; ask for the return of the matches and kerosene etc.)

2.5. Questioning Skills

2.5.1. Introduction

Questions constitute a large part of a teacher's trade in stock. The success of teaching depends on how skilful teachers are with the use of questions. The kinds of questions teachers ask influence the levels of thinking operations pupils engage in.

It is always true that good teachers ask a variety of questions during their interactions with pupils in the class. However, it is generally said a large proportion of teachers tends to use the same types of questions that appeal to them or are favourable for them.

This section first discusses the purposes of questioning and then shows a variety of questions that teachers might want to use. The last part of this section presents strategies for the effective use of questions.

2.5.2. Purposes of Questioning

Questions have a wide range of educational purposes depending on the context of the classroom. Questions may be used for communication, classroom management, reviewing, drawing attention, stimulating pupils' thinking, evaluating pupils' understanding, and building expression.

Questions for reviewing (checking pupils' Relevant Previous Knowledge (R.P.K.))

Questions can be used to review or find out what pupils know about a subject or topic. A teacher can utilise questions to check the previous knowledge of pupils. It is always a good idea that a teacher introduces his/her lessons by reviewing pupils' previous knowledge. By doing so, the teacher can find out what pupils already know and he/she can quickly adjust what to teach in accordance with pupils' needs. Implementing this process on a regular basis is very beneficial. This technique builds up confidence in pupils and assures them of the relevance of the topic they already have knowledge of. Questions can also be used to review the core points they have learnt in the previous lesson.

Sample question for the lesson on properties of soil:

"Name the types of soil you know"

Questions to draw attention to core points or important feature of a topic

Questions can draw pupils' attention to core points of a topic as a way of emphasizing a point.

Sample question for the lesson on properties of soil:

"Does water pass through different types of soil at different rates?"

Core point:

Different soils allow water to drain through them at different rates.

Questions for stimulating pupils' thinking

Teachers can use questions to trigger pupils' thinking. Diverse range of questions can prompt low level of cognitive activity, such as recall of facts and also high level of cognitive activity, such as, analysis, synthesis, application or evaluation of knowledge. Appropriate questions can stimulate and motivate pupils to think independently, objectively and critically.

Sample question for the lesson on properties of soil:

"Which soil would be the best for growing crops in the school garden and why?"

Questions for evaluating pupils' understanding of content (core points, etc.)

Questions can be used to determine if pupils understand the lesson content. When pupils' answers show poor understanding, the teacher may need to teach the content again adding extra assistance. When pupils' answers show good understanding, the teacher can present a more advanced content. Appropriate questions find out pupils' difficulties and problems in particular areas of the topic.

Sample question for the lesson on properties of soil:

"Give one reason why water passes through sand faster than clay."

Note:

Some teachers repeat questions like "Do you understand ...? " and "Are you OK with it?" when they want to check whether their pupils have understood the content of their lesson well. However, it is commonly observed that those pupils who respond saying " Yes, we understand, Sir/Madam!" do not in fact understand the teaching content. Teachers should not repeat those questions too frequently because pupils develop the habit of saying "Yes, we understand." often to please the teacher even though their understanding may be low. This implies that teachers cannot rely too much on such questions like "Do you understand …" and "Are you OK with it?" when they want to check pupils' level of understanding. Teachers should use more specific questions instead, leading pupils to say more than just "Yes, Sir/Madam".

Questions for communication

Questions offer verbal interactions between pupils and teachers. Appropriate questions help to increase the quality of pupils' communication. Questions can help teachers to establish a friendly atmosphere in the class.

Sample question:

"What did you have for lunch yesterday?"

Questions for classroom management

Such questions seek to control classroom activities and cut down on disruptive behaviour.

Example question:

"What made you behave like that?" "Do you think you are making the learning environment in the class better?"

2.5.3. Types of Questions

Classification of questions is dependent on one's view of the purpose of questions, or the purpose of education. Thus, it varies from teacher to teacher. However, it is beneficial to know some of the major classifications of questions and types of questions discussed in each classification. There are many ways of classifying questions. One of such ways is to determine whether they are open or close questions.

Close and Open Questions

Close questions accept only a narrow range of responses and the number of responses is limited. Close questions expect convergent thinking. Some close questions allow only one "correct" or "right" answer. Answers to some close questions are "yes" or "no".

Examples of close questions:

"What is the chemical formula for common salt?"
"When did Ghana achieve full independence?"
"If a + 4 = 6, find the value of "a"."
"10 + 5 = ?"

Open questions emphasize divergent thinking and can accept a wide range of responses. The number of answers to an open question may be two or more. Open questions encourage pupils to use their past experience and justify their opinions/thinking. Some open questions ask pupils to make judgments based on their own values.

Examples of open questions:

"What should we do to keep food from going bad?"
"If a + b = 6, find the values of a and b"
"Give different pairs of numbers whose sum is 15"

It is important for teachers to choose whether to use close or open questions depending on the teaching contexts.

Low and High Order Questions

Questions can be classified depending on whether they are low order or high order. Examples of low order questions are perceiving questions (based on observation) and recall questions (based on knowledge or memorisation of facts). In recall questions, "Who?", " What?", "Where?" and "When?" are often used.

An example of perceiving questions:

"What is the colour of the liquid in the beaker?"

An example of recall questions:

"Who was our first president?"

High order questions encourage pupils to think rather than just to remember some facts that they have previously acquired. Those questions often require higher cognitive level. One of the best-known classification of questions related to people's cognitive levels is the classification that uses the cognitive domain of Bloom's Taxonomy[1].

The categories in the cognitive domain and brief explanation of them are as follows.

High order/More Complex

Knowledge	Recalling data, information, experience, facts etc.
Comprehension	Understanding the meaning, translation and interpretation of instructions, information and problems based on prior learning.
Application	Applying a concept or what was learned in the classroom in a new situation.
Analysis	Separating material or concepts into component parts so that its organizational structure may be understood. Distinguishing between facts and inferences.

[1] Bloom, B.S. (1956). *Taxonomy of Educational Objectives*, London: Longman

Synthesis	Put parts together to form a whole, with emphasis on creating a new meaning or structure.
Evaluation	Making judgments about the value of ideas or materials.

Example questions using the categories:

"How are you going to use this core point you learnt today in everyday situations?" (Application)
"How does this equation work? (Analysis)
"What happens when you mix water and palm oil? (Synthesis)
"Is this formula workable?" (Evaluation)

It is important to note that it does not mean high order questions are always better than low order questions. After putting pupils' understanding and contents of the lesson into consideration, a well-balanced mixture of these questions is needed.

2.5.4. Strategies for Effective Questioning

Experienced teachers tend to use a variety of strategies for effective questioning in the classroom to help pupils. It is commonly observed that the pupils have difficulty in answering a question. Sometimes, they do not know how to answer. Sometimes, they are not sure what the question is about. Thus, it is crucially important for the teachers to equip themselves with a variety of questioning strategies. The following are some examples of the strategies.

Pausing

Do not expect answers too soon; give pupils some time to digest the question first. To receive responses, teachers should wait for around 5 seconds. Without ample time to think, teachers cannot expect pupils to process their thinking. This is one of the most effective strategies.

Check the level of vocabulary

Check the wording of your questions to make sure it is up to the vocabulary level of your pupils. New vocabulary should be used with care and only after it has been seen that the words can be well understood by the pupils.

Prediction of Answers

Let pupils predict answers even when they are not very sure. This encourages higher levels of thinking and increases pupils' active participation. It is important that teachers make this the culture of the class so that pupils always feel free to predict answers.

Random selection

Select pupils at random to answer questions. If the teacher follows the same patterns of

selecting who to answer, some pupils will neither be listening nor thinking until it is their turn.

Using Pupils ' names

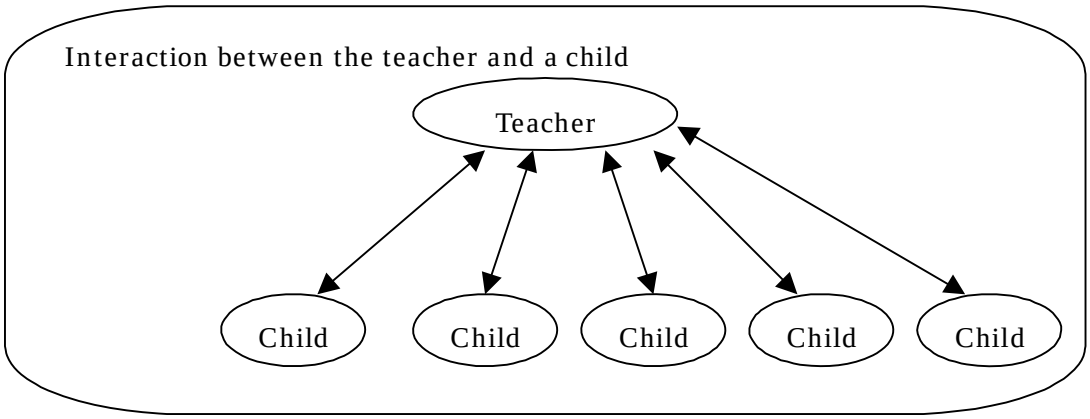
Instead of referring to pupils as, 'the one in the corner wearing the red dress', or 'the one in glasses', call pupils by their names.

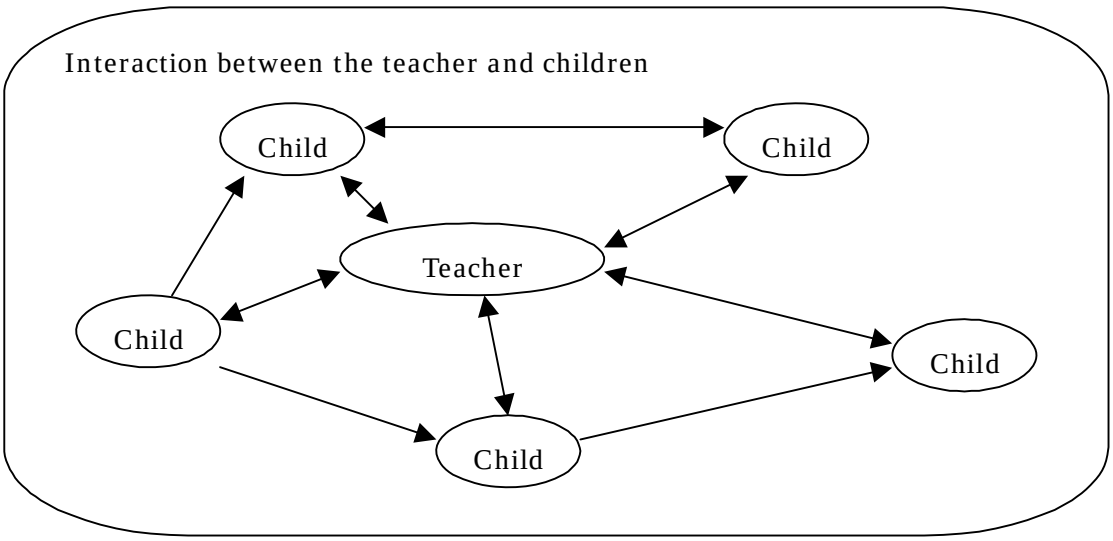
Providing Additional Information

Correct responses may be difficult because a key item of information is missing.

Interacting with each other

Get pupils to interact with each other. Try to change the questioning pattern that involves only the teacher and single pupil. Encourage pupils to ask questions. Pupils can ask questions based on what their friends have said. If pupils are to become problem solvers and critical thinkers, we should encourage them to ask questions.





Ineffective and inappropriate questioning practices

- Do not select the same pupil(s) to answer questions because they always respond correctly.

- Do not become a critical assessor. Questioning is not all about assessing pupils. Pupils can make mistakes and they learn a lot from their mistakes.
- Do not ask questions too quickly. Pupils need some time to digest a question and to process their thinking. Speed of delivery is not always a priority.
- Do not repeat a question too often. Pupils lose attention and focus if you ask the same question unnecessarily too many times.

2.6. Effective Use of Chalkboard

The first ready-made aid for the classroom teacher is the chalkboard. Due to its central position as an ever present resource, the way and manner a teacher uses this resource may affect his/her lesson positively or otherwise. To achieve effective teaching and learning, the classroom environment as well as the correct use of the chalkboard should be consciously planned and executed.

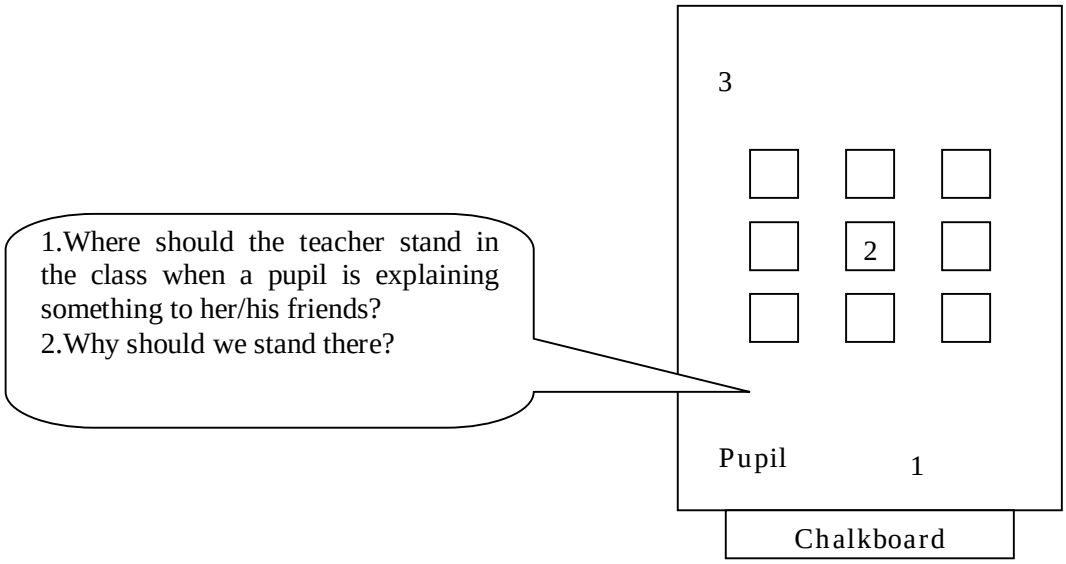
Things to Consider before writing on the chalkboard (Eye contact)

Teacher needs to ask if everyone in the classroom can see the chalkboard clearly.

Teacher is supposed to tell pupils to let him/her know if they cannot see the chalkboard clearly. Teacher needs to create a friendly atmosphere that helps pupils to tell the teacher about it without hesitation. An example of a situation that might interrupt pupils' view is reflection from sunlight.

When using the chalkboard teachers should always ensure that:

- The chalkboard is divided into convenient columns
- The date is written fully at the right-top corner of the board
- The title of the subject/topic/sub-topic is written at the top of the central column
- Exercises given to pupils on the chalkboard are placed under "Worked examples".
- Pupils do not talk when the teacher is writing on the chalkboard.
- They face the class when talking
- They position themselves so as not to obstruct pupils from seeing the board.
- They summarise the main points of the lesson on the board
- They always seek learners' opinion before cleaning the board.
- They do not clean the board with the bare hands.
- They clean the board after each lesson.

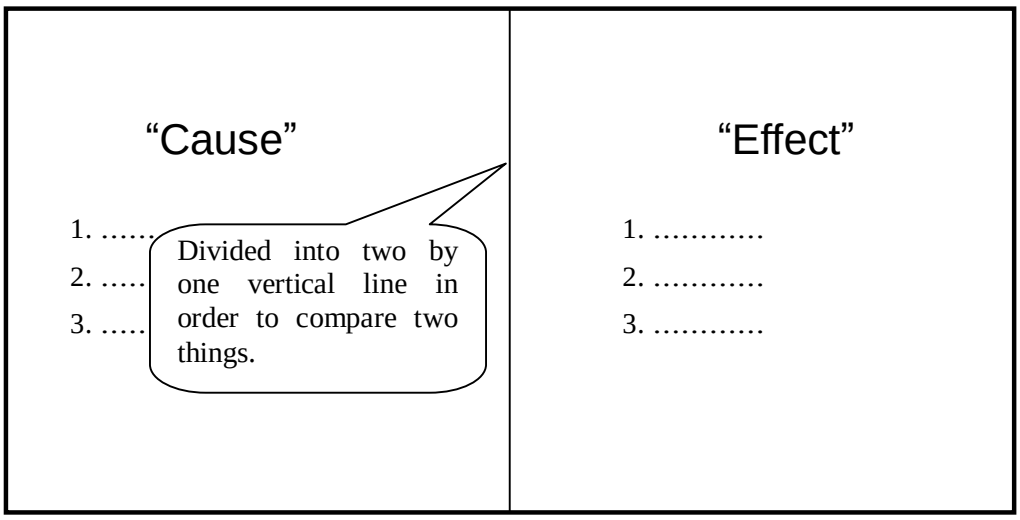


Types of layout of the chalkboard

Plan the layout of the chalkboard. It is helpful to write or draw the layout of the content in a notebook before going to the classroom. Some experienced teachers keep practising this.

A good teacher can make effective use of the chalkboard. Even though conditions and sizes of chalkboard vary from school to school and class to class, a teacher can try to make the most of it. One of the ways of doing so is dividing the chalkboard. When dividing, the teacher needs to consider the contents and the sizes both of the chalkboard and the class. Examples of division of the chalkboard are shown below.

Example A



Example B

Which of these materials conduct electricity? **Materials** Nail Pencil Paper Can Bottles (plastic, glass)	**Predictions**	**Results**

Divided into three columns, for materials, predictions and results.

Example C

Experiment Title: Aim: Apparatus:	Method: Observation:	Conclusion

Divided into four, showing clear differences in sections of an experiment.

2.7. Gender Issues

2.7.1. Gender

Gender is used to refer to the characteristics attributed to women, men, boys and girls. These characteristics may be related to aptitude, emotion, physical ability, etc.

- It is different social roles assigned to males and females by a society.
- It involves men or boys as much as it does women or girls and can change over time.
- Gender relations are those social relations cultivated and nurtured by human beings in the society.
- Being a socio-cultural construct it is organized differently in different societies, and affects the expectations for boys and girls, men and women.
- The term gender is mistakenly used to connote women or sex.
- While a person's sex is biologically determined, their gender is socially constructed (learned).

2.7.2. Gender Related Terms and their Meanings

Gender bias

This is when you give unequal treatment to individuals based on their gender. For example we are showing gender bias if we assume that our daughters will prefer to play with dolls and cook while our sons will prefer to play with cars and building structures of objects.

- We base this assumption on gender bias rather than true knowledge of the individual.
- Gender bias applies to all areas of life. For example, in the home, work place, religious institutions and school curriculum.

Gender equity

It is the extent of being fair and reasonable to all individuals.

It calls for a fair share of benefits as well as responsibilities of the family, community and school (syllabus, pupils' textbooks, teacher's handbook and other resource materials for studies).

Gender equity strategies may or may not achieve desired results and need to be monitored closely. Equity is the means while equality is the desired result.

Gender equality

It connotes that the suppression of one sex by another is wrong and must be corrected.

It is a condition in which women, men, boys and girls participate as equals, have equal access to resources and equal opportunities to exercise control. It is achieved through gender equitable strategies. For example, producing curriculum that is gender equitable is a strategy to achieve gender equality in the classroom.

Girl Friendly

The term is often used in reference to curriculum, classroom and school environment. In this context, the term refers to content strategies, assessment, attitudes, policy, etc, which are conducive to girls' full participation and success in all areas of school life.

2.7.3. Some Suggested Solutions to Gender Insensitivity

- Teachers should endeavour to give equal attention to both boys and girls.
- Teachers should encourage both boys and girls to develop their hidden potentials.
- During class work or project work, girls should be assigned leadership roles and be made to actively participate.
- Class assignment should not be done very often on competitive basis but sometimes on a more co-operative and collaborative level with good team spirit.
- In setting examination questions, gender bias questions should not be set; instead general questions should be set.
- Teachers should take workshops on gender issues very seriously.

Table 7: Gender Issues in Textbooks

Gender Bias in language	Gender Balance in language
When men are on the moon, they can't talk to each other as we do.	When astronauts are on the moon, they can't talk to each other as we do.
A poor man may eat more nutritious food than a rich man.	A person of low income may eat better than someone who is wealthy.
How does a farmer look after the animals on his farm?	How do farmers look after the animals on their farms?

3. Teaching and Learning Activities

In this section, types of teaching methods are discussed first. Then, some examples of teaching and learning activities in Mathematics and Science are presented subsequent in the subsequent part.

3.1. Types of Teaching Methods

Four effective methods of teaching are shown in this section. They are

- activity method;
- discussion method;
- question-and-answer method; and
- demonstration method.

It is important for teachers to be aware of the advantages and disadvantages of each method. Then, teachers need to choose the most effective method of teaching depending on the content/topic or classroom situations. These four methods are presented below.

3.1.1. Activity Method

In this method, pupils are provided with materials and an activity is described or demonstrated for them to do.

Some Advantages of the Method

- Pupils learn through first hand experience.
- Pupils do not easily forget what they have learnt
- The method demystifies Science.
- It increases interest in Science.
- It fosters co-operation among pupils.

Some Disadvantages of the Method

- It can be time-consuming.
- Breakages and damage of equipment and materials can occur.
- It involves the liberal use of materials and may therefore be costly.

3.1.2. Discussion Method

This method involves getting pupils together to talk about issues so each one can bring out his/her own idea.

Some Advantages of the Method

- Pupils have the opportunity to practise their oral communication skills.
- It gives pupils practice in critical and evaluative thinking and listening.
- It helps pupils to clarify their thinking.
- Pupils learn readily from each other.
- It provides good practice for problem solving.

Some Disadvantages of the Method

- It does not easily lend itself to all types of subjects or topics.
- It is difficult to achieve maximum interaction when the group is large.
- It may give opportunities for the brighter pupils to show off.
- A few may dominate a discussion while some may never participate in it.

3.1.3. Question-and-Answer Method

In this method, the lesson is developed through effective questioning by the teacher.

Some Advantages of the Method

- It stimulates pupils to think.
- It helps to diagnose pupils' difficulties.
- It helps to determine pupils' progress.
- It helps pupils to clarify their answers.
- It helps to direct pupils' thinking.
- It encourages self-evaluation for pupils.
- It is a means of feedback for the teacher.
- It is an effective class control device.

Some Disadvantages of the Method

- It is a slower method for dealing with information.
- Constant use of questions requiring a factual answer encourages memorization and discourages pupils to think.
- Consistently answering questions incorrectly may cause pupils to lose their self-esteem.

3.1.4. Demonstration Method

This method involves the use of TLMs to show some concepts/ideas in the lesson.

Some Advantages of the Method

- It trains pupils to be good observers.
- It stimulates thinking and the formation of concepts and generalizations.
- It is financially economical since only the demonstrator needs materials.
- It is very effective as an introduction to skill learning.
- It is most appropriate when teaching pupils how to operate a piece of equipment.
- It has high value since it often involves the use of instruments and equipment that might be new to the pupils.

Some Disadvantages of the Method

- Much planning and preparation is required on the part of the demonstrator.
- It can be ineffective if the demonstrator just carries out the activities without asking for feedback.
- It is not suitable for a large class or with extremely small objects.
- It can lead to imitation without understanding.

3.2. Teaching and Learning Activities in Mathematics

3.2.1. Preparation of Multi-Base Materials Using Manila Card

Chalkboard Size

Step 1: A manila card should be divided into a number of equal square sizes. The square size should be 5cm as shown in Figure 1. A single square of 5cm by 5cm should represent the Cube.

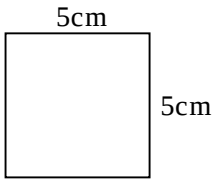


Figure 1

Step 2: Rod should be represented by 5cm by 50cm (5cm×10 of Cubes) as shown in Figure 2.

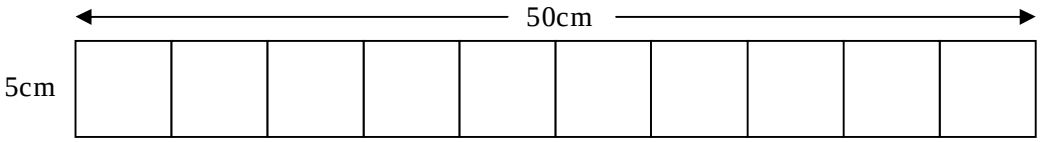


Figure 2

Step 3: Flat should be represented by 50cm by 50cm (5cm × 10 Cubes representing one side of the square) as shown in Figure 3.

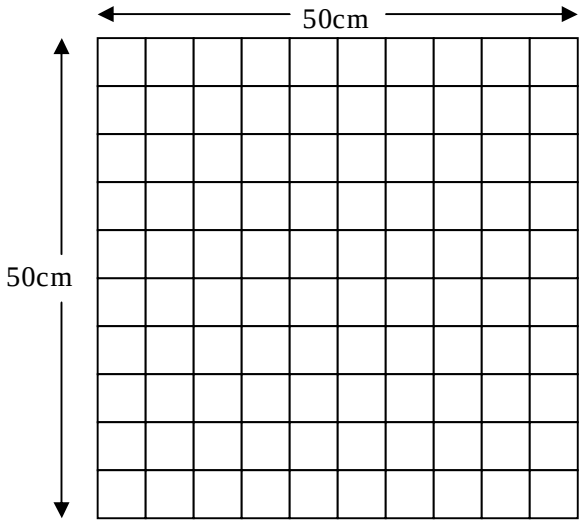


Figure 3

Desktop Size for pupils

Step 1: Manila card should be divided into a number of equal square sizes. The square size should be 1cm as shown in Figure 4. A single square 1cm by 1cm should represent the Cube.

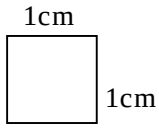


Figure 4

Step 2: Rod should be represented by 1cm by 10cm (1cm×10 of Cubes) as shown in Figure 5.

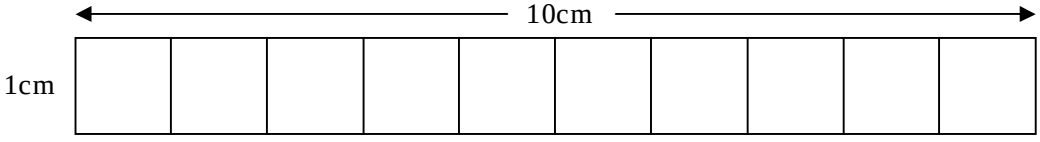


Figure 5

Step 3: Flat should be represented by 10cm by 10cm (10cm × 10 Cubes representing one side of the square) as shown in Figure 6.

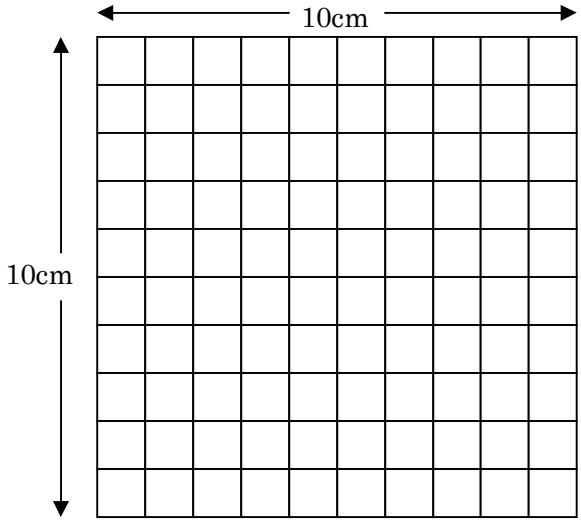


Figure 6

Topics that can be taught using the prepared Multi-base Materials from Manila cards:

1. Place value
2. Collecting and handling data - graphs
3. Decimal fractions
4. Area and perimeter of shapes
5. Fractions
6. Vectors
7. Percentages

(Refer to topics listed above in the Mathematics manual.)

Note:

1. Depending on the thickness of the Manila card, the teaching and learning material prepared may assume a 3D shape.
2. Other materials that can be used to prepare the Multi-base Materials include wood, cardboard, plastics, empty cartons, formica, etc.

3.2.2. Preparation of Cubes from Wood

Materials needed:

- Wood
- Rulers
- Cutters, Pencils

Chalkboard Size

Cut the wood to the dimension 5cm by 5cm by 5cm as shown Figure 7.

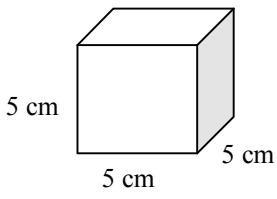


Figure 7

Desktop Size for pupils

The same materials are to be used. Dimension: 1cm by 1 cm by 1 cm.

Topics that can be taught using Cubes:

1. Operations on numbers less than 10
2. Volume of cuboids
3. Fractions
4. Pre-number work (staircases)

3.2.3. Preparation of Dice Using Wood

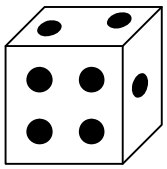


Figure 8

Chalkboard Size

You will need to cut wood into a cube of 10cm by 10cm by 10cm dimension.

Label the surfaces with permanent marker so that the sum of directly opposite surfaces equals 7, i.e. directly opposite faces are 1 and 6, 2 and 5, and 3 and 4.

Desktop Size for pupils

The dimension should be 2cm by 2cm by 2cm. Use the same style of numbering as described above.

Topics that can be taught using the dice

- Probability
- Ordered pairs
- Operation of numbers
- Shade in game on fractions (in this case the surface of the die should be numbered in fraction form. Example $\frac{1}{2}, \frac{2}{5}, \frac{3}{4},$ etc.

3.3. Teaching and Learning Activities in Science

3.3.1. Guidelines for Drawings in Science

- Diagrams should have a margin.
- Create space for the title of the drawing.
- Diagrams should be bold, simple, neat, clear and attractive.
- Draw with free hand and the lines should be straight and not woolly or double.
- Labels should be done with straight lines within the margin and the lines should not cross each other
- Lines used for labels should not have arrows.

3.3.2. Experimentation

Importance of Experiment

An experiment is, without doubt, a significantly important aspect of Science lessons. It makes the learning of scientific facts and acquisition of knowledge real Science. If Science is the study

of the environment, we need to investigate natural phenomena through observing, identifying a problem, experimenting and communicating findings. We can build certain attitudes like objectivity and open-mindedness in experiments as well. If pupils are to be scientific in thinking, they should be encouraged to see/do experiments in class.

Experiments are expected to help pupils to:

- Build scientific attitudes like objectivity and open-mindness
- Develop scientific ways of thinking
- Acquire process skills of Science
- Increase interest in the environment and Science
- Enhance scientific knowledge acquisition
- Relate textbook knowledge of Science to the real world

Types of Experiment

There are several types of scientific experiment. The following shows three major types.

- Testing a specific hypothesis.
- Exploratory/discovery.
- Data gathering.

An example of experiment on testing a specific hypothesis

In an actual classroom situation, testing of a specific hypothesis is commonly used and is highlighted here. Through an experiment, pupils can test whether a hypothesis is correct or not. Testing a hypothesis should help pupils to acquire correct scientific knowledge, concept and ways of thinking. A brief example of this type of experiment is shown below:

Topic of Experiment:

Electrical Circuits with Bulbs in Parallel

Hypothesis:

The brightness of two bulbs in a parallel circuit is the same.

(Conducting the experiment)

Result:

The brightness of two bulbs in a parallel circuit can be different. (If the bulbs are different kinds)

Note: Experiment is done before the teacher tells pupils the answer. Pupils are to find it out themselves.

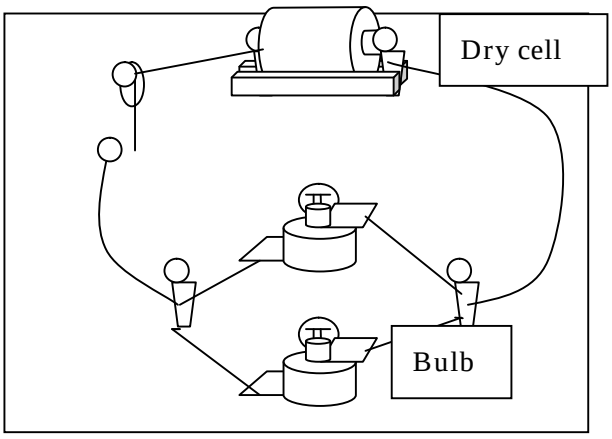


Figure 9

Another Type of Experiment

Unlike the type of experiment shown above, an experiment can also be used to support a fact that has been taught already in a lesson. For instance, a teacher can tell pupils the fact that the

brightness of two bulbs in a parallel circuit is not always the same. Then, he/she will conduct the experiment to prove whether the statement or the fact is true or not. In this case, the experiment is done after the teacher tells pupils the fact.

It is important to have variety of types of experiment. When writing the scheme of work, it is a good idea to include several types of experiment. It should be noted that selecting types of experiment depends heavily on the class size, the contents of the topic, availability of the resources, pupils' interest and ability.

3.3.3. Improvisation of Teaching/Learning Materials

In the teaching of Science and Environmental Studies in the primary school, TLMs are carefully selected from the environment or improvised when the actual materials are not available. This section stresses on improvisation of some challenging materials.

Improvisation

Improvisation is the use of materials, which are readily available in the environment in place of the original materials, which are not available or are expensive, delicate or sophisticated to bring about the same leaning effect. Examples of types of improvisation are shown below.

- Improvisation by Substitution
- Improvisation by Construction

Improvisation by Substitution

This is replacing the original or actual standard prototype material with one which is locally available and which can perform identical functions.

Examples:

Original Materials	Substitution (Substituted Materials)
Distilled water	Rain water
Trough	Plastic bowl
Spatula	Spoon
Delivery tubes	Discarded drinking straw/plastic tubes

Improvisation by Construction

This involves making use of locally available materials to design, construct / build / produce an apparatus. These pieces of apparatus so constructed are referred to as improvised apparatus. Examples of improvisation by construction are:

- Construction of a pinhole camera using plywood, tracing paper and nails.
- Construction of a periscope using PVC pipe tube and plane mirrors, manila cards or stems.
- Construction of electrical circuit board using plywood, screws, aluminium sheet or foil and flashing bulbs.

- Making a test tube holder from a metal wire or bamboo sticks.

Importance of Improvisation of TLMs

- It demystifies Science and creates interest in learning it.
- Improvised materials are less expensive, low cost or cheaper.
- It enables many of the learners to engage in practical activity at the same time.
- It enables the learners to develop an appreciation of the use of everyday things in their environment in learning Science and Environmental Studies.
- Pupils learn not to discard all items at home as they get to know that there are more uses for them at a later time.
- It helps to develop self-reliance and sense of initiative in the teacher.
- It encourages group work hence, co-operation and tolerance are enhanced.
- It helps to reduce the purchasing of materials.

Principles to consider when improvising TLMs

- The function and working principles involved.
- Where and how to get the bits and pieces needed for improvisation.
- The need to co-operate with some local craftsmen, e.g. carpenters, mechanics, welders etc.

Principles underlying the use of improvised materials for teaching and learning

- The function and working principles involved.
- Will the improvised materials help pupils to understand what is being demonstrated? Will the improvised materials suit the level of the pupils?
- Is the improvised material safe (is precaution against dangers taken into account)?
- Are the materials to be used readily available or affordable?

Collection of Materials for Improvisation

- The pupils should be greatly involved in the collection of materials.
- Collecting trips should be organized.
- We should look for materials within our environment.
- Scrap materials could be collected from kitchen, clinics or hospitals, local craftsmen, rubbish dump, market or houses.
- Materials can be bought from the market or shops.

Table 8: Some Suggested Improvised Materials for Teaching Science in Basic Schools

MATERIAL	IMPROVISED MATERIALS
Filter paper	Cotton wool/cloth/foam/cement paper/
Beam balance	Make two scale pans from coffee tin lids or plastic pipelines. Hang these by thread at the ends of a cloth hanger. Hang the hanger by its hook on a nail.
Pipette	Drinking straw, ball point barrel
Delivery tube	Infusion tube boiled for 15 minutes before use.
Magnifying glass or hand lens.	Pick used transparent electric bulb, break off the black seal on the metal and remove the inner glass which holds the filament. Wash and fill with water and use it to observe things. Other things that can be used are, spectacles, a clear bottle, a beaker.
Concave mirror	Use steel wool or metal polish with cotton to polish thoroughly the bottom part of an empty canned drink. E.g. Fanta, Coke.
Round bottom flask	Pick a discarded electric bulb; remove the black seal and the inner glass tube. Wash and use as round bottom flask
Beaker and Funnel	Get a transparent plastic bottle and cut through its circumference (2/3 way of its height). Use bottom portion as beaker and top portion as funnel.
Measuring devices for measurement of volume of liquids.	Collect transparent flat bottom plastic bottles, with straight sides and cut off the top part. Paste a stick of paper along the outside and using an injection syringe and water, calibrate the container using a fixed volume of water drawn at a time. Paste a cello tape strip over the calibrated strip of paper.
Rubber stopper or cork	These can be cut from discarded bathroom sandals, corn stalk or cob, bamboo or raffia palm stalk, etc by cutting them to the required shape.
Standard masses or weights	Use coins, bottle tops, nails of the same size, bolts and nuts.
Magnets	Get magnets from old discarded radio speakers, magnetized bar metals, etc.
Electro-magnet	Wind round a nail (15 cm long) an insulator copper wire, connect a dry cell to its terminals and use it to pick tiny magnetic substances such as office pins, small nails, etc
Biological specimens I Animals II Plants III. Flowers	Make a collection of small animals by putting them in formalin and preserving them in bottles containing formaldehyde. Make a plant-press by collecting or picking fresh plants, place them in a double newspaper sheet. Sandwich them between two cardboards of the same size. Tie with a string and leave them to dry in a room/shade. Make a flower and pin it onto a cardboard and label its parts.
Calcium hydroxide	Get spent carbide from a welder's shop. Add water and decant. When mixture settles, clear solution of the hydroxide remains.
Sulphur	Can be bought from market.
Iron (Iron fillings)	Metal shavings / pieces of steel wool
Alkaline solution	Ashes from burnt plantain peels, cocoa pods or ordinary wood ash added to water in a beaker and stirred. Filter the mixture. The filtrate is an alkaline solution (KOH)
Potassium Permanganate	Use food dye or "shoodee" which is used to polish shoes.

MATERIAL	IMPROVISED MATERIALS
Indicators	Detach and grind some petals of flowers. Add water to the ground pulps and boil for a few minutes. Allow them to settle on cooling and filter solution. Dye a filter paper with solution; allow them to dry and use as litmus paper for acid and alkaline tests.
Acids	Extract juices of lime, lemon or tomato and use as acids. Also one can use vinegar, or acids from car batteries.

4. Lesson Plan

4.1. Lesson Plan Preparation

The secret of all good teaching is proper planning. If you want your teaching to be effective, then you have to think carefully during the planning stage. You can make your thoughts useful if you translate them into lesson plans. A well-planned lesson helps the teacher teach with confidence. Before you can prepare your lesson plans you will need some basic materials. They are the main reference books (the syllabus, teacher's handbook, pupils' textbook or any other source of reference or books or materials) relevant to the subject or topic to be treated by the teacher. The syllabus contains the list of the topics to be studied and the level to which a teacher must teach each topic.

The lesson plan approved for use by basic schools in Ghana has the following components. Note: Mathematics and Science are used as examples of subjects.

4.1.1. About the Subject and other Relevant Information

Subject

This is the particular subject that the lesson plan is about. e.g. Mathematics, Science, etc.

Week ending

This is the last day of the working week for which the lesson plan is meant. The working week usually starts on Monday and ends on Friday.

Date /Day/Time/Duration

These refer to the particular date, day and time for which a particular lesson is meant. e.g. 5th May, 2007, Thursday: 10:00am-10:30am. The duration is the specification of the length of time allocated to the lesson. e.g. 30 mins or 60 mins.

Topic/sub-topic

The topic is usually taken from the syllabus and the subtopic is from the scheme of work. The topic is the small area of learning or subject matter which is to be covered in a particular lesson within a particular time/period. But sometimes when the topic is too broad, it can be subdivided into subtopics. For example:

Science	Topic: Water	Sub-topic: Sources of water
Mathematics	Topic: Fraction	Sub-Topic: Addition of fractions with different denominators.

Reference books

These are the list of books, textbooks or any other sources of information that could be referred to for information that may be required for the lesson to be taught. Where information is obtained from the pupils' books and teacher's guide, the pages must be indicated. E.g. Pupils' Mathematics Textbook 4, Page 12.

4.1.2. Relevant Previous Knowledge (R.P.K.)

This is the knowledge, skills or ideas, which the pupils already know, and which relate to the

new topic that is to be learnt. This knowledge is very helpful to the teacher to make him construct his teaching. It can also be used as a starting point or foundation, upon which the new lesson could be built. If there is no interaction between the R.P.K. and the new topic, understanding of the new topic becomes more difficult. It must be noted that R.P.K. does not necessarily come from a previous lesson. There must be an obvious link between the R.P.K. and the new topic. The R.P.K. could be general knowledge acquired from experience or real life.

4.1.3. Details About the Class

The sub-heading named "Details About the Class" explains the current situation of the class in terms of the general information concerning the pupils, their academic progress, interest in the subject and attitude towards the subject. While R.P.K. focuses on pupils' knowledge related to the lesson topic, "About the Class" probes into the background of the pupils of the class. "About the Class" should help the teacher to choose what kind of approaches would be best suited to the pupils of the class. Providing information for "About the Class" in a lesson plan is optional; however, it is advised that teachers try writing and thinking about the class. This should be a very helpful piece of information.

4.1.4. Objective(s)

The objective states the value of the lesson to the learner. It is a statement indicating why the teaching is being done and describes the target set for attainment or achievement at the end of the lesson.

- The objective should be stated in behavioural terms to describe observable behaviour.
- The objective tells what changes we intend to bring about in pupils. It spells out the knowledge, abilities, and attitudes that we expect our pupils to gain as a result of our teaching.
- The objectives specify what the pupils should be able to do at the end of the lesson, including mental, affective and psychomotor skills.
- The objective in the lesson plan should not to be confused with the more general and broad objectives of a particular subject. The objective must be stated using performance/active verbs based on at least two of the profile dimensions stated in the syllabus. i.e. knowledge and understanding, application of knowledge and process skills and attitude (Science).

In stating lesson objectives (instructional objectives) the following points must be remembered.

- A lesson can have more than one objective. Do not however aim at too many.
- The objective(s) must be stated in a way that shows what the desired change in the pupils' behaviour will be.
- The objective(s) must be achievable within one lesson, unless specified for a double lesson.
- The objective(s) must relate to what the pupils will learn rather than what the teacher will teach. This means objectives should be child-centred.
- The change in the pupils' behaviour should be observable and measurable.

A few of the good instructional objectives are as follows:

By the end of the 30-minutes lesson, pupils will be able to:

- measure the size of a leaf using squares
- calculate the density of a regular object

- interpret a graph showing annual rainfall
- mention at least three differences between a plant cell and an animal cell
- draw a complete flower and label it correctly
- list at least five sources of water

Examples of objectives for the various profile dimensions are as follows:

- Knowledge and understanding: - List five sources of water.
- Application of knowledge: - Interpret a graph showing annual rainfall.
- Process skills and attitudes:-Draw a complete flower and label it correctly.
- The objective(s) stated for each lesson should be Specific, Measurable, Achievable, Realistic and Time bound (SMART).

4.1.5. Teaching /Learning Materials

Any materials that are used to make learning more effective should be listed here. The materials listed here must be relevant and very suitable for the lesson. Learning aids can be real objects, models, charts, pictures, etc. It is important to remember the following points when using learning aids.

- They must be adequate for the number of pupils in the class.
- Real objects are the best learning materials unless otherwise stated.
- Models, pictures, photographs and charts are used when real objects cannot be obtained. These must be simple, clear and brief.

4.1.6. Teacher/Learner Activities

These activities indicate how the teaching must be done, according to the stated objectives. Teacher writes down in a step-by-step manner the way the learning situation will be explored. The steps must indicate:

- Teacher Activities: Strategies the teacher would use to promote and facilitate pupils' learning.
- Pupils' activities: What the pupils should perform or go through in order to learn.

The activities must be child-centred instead of teacher-centred. This implies that the teacher should have the pupils as the focus of the lesson. The methods of organising work which include discovery, remedial work and the use of textbooks, work cards, etc. are to be clearly shown. For example:

- Pupils use match boxes, draw or colour squares to represent various numbers to pupils born on each of the days of the week.
- Pupils draw bar graphs/block graphs to present numbers of objects and pupils.

The lesson must begin with an introduction, which must be designed to:

- Connect the new topic with the previous knowledge or experience of pupils.
- Motivate and capture pupils' interest from the beginning through to the end of the lesson.
- Condition pupils' minds for the lesson.

4.1.7. Core Points

These are the main ideas or concepts/skills that the lesson is aimed to achieve. In developing the lesson, the teacher skilfully collects these facts, ideas, values and concepts from the pupils through questioning and lists them systematically on the chalkboard as a summary. For example:

Science

- Types of soil: Sandy, clayey and loamy soils are some of the types of soil.

Mathematics

- Block graphs: Block graphs involve the piling of objects on each other.

4.1.8. Evaluation / Exercise

Evaluation involves exercises to be carried out by pupils the results of which teachers can use to make value judgment for the improvement of teaching and learning.

- They are processes for measuring the effectiveness of the teaching/learning activities and the purpose of evaluation exercise is to find out if the objectives set for the lesson have been achieved or not.
- Evaluation may include homework, class exercises, quizzes, (oral and written) and assignments, etc.
- Pupils could do the evaluation exercises individually, in pairs or in groups. These can form the basis for the teacher's continuous assessment marks, which in turn provide the basis for the teacher's remarks.
- Evaluation/exercises are not meant for pupils only; they can be used to assess the performance of pupils as well as the teaching/learning process (methodology), and also the effective use of teaching/learning materials. The performance of the pupils in the evaluation exercises may be used to review the methodology and the teaching/learning materials in assisting pupils individually to improve upon their performance.

4.1.9. Remarks

This is the statement made at the end of the lesson to indicate if the lesson was successful or not and why. The remarks should also state the specific strengths, problems or weaknesses observed during the lesson in the performance of both the teacher and the pupil for further action. For example, after a lesson on the topic:

- Symbols of elements: pupils were confused about the symbols of those elements which do not have English names, such as, Potassium –K, and, Sodium –Na. The lesson was therefore not successful and should be taught again using a different approach.
- Indices: pupils were confused about the square of positive and negative integers. The lesson was therefore not successful and should be taught again using a different approach.

4.2. Lesson Presentation

In this section, three steps of lesson structure are discussed. They are the introduction, development and conclusion/closure of a lesson.

4.2.1. Introduction

The introduction of a lesson serves to arrest the attention of the pupils at the beginning of the lesson. The introduction should be brief, attractive as well as arousing to sustain the interest of the pupils. The content of the introduction must be related to the subject matter of the lesson. Also, the pupils' R.P.K. must be tested during the introduction stage of the lesson. The following broad ideas might be used as introduction to lessons.

- Ask questions about previous lessons that are related to the present one. A few examples of such questions must be included in the lesson plan.
- Discuss a situation which is familiar to the content of the lesson with the pupils.
- Display an interesting learning aid related to the lesson and discuss it with the pupils.

The importance of introduction

- It helps in preparing the pupils for the lesson.
- It arouses interest and provides a conducive environment for the lesson.
- It helps in linking previous knowledge with the one to be taught.
- It helps to eliminate misconception in previous knowledge.

4.2.2. Lesson Development

The development of the lesson is written under teacher/learner activities and organised under steps in the lesson plan. The number of steps depends on the nature of the topic. The subject matter will have to be presented in an orderly and logical sequence in the form of activities. The activities can be in the form of verbal interactions e.g. discussions, asking and answering of questions, or performance of physical activities like demonstrations, experiments, constructions, etc.

It is important to start with what is known to the pupils before the new information is introduced to them. The teacher must present the information from a simple level and move on gradually to the more difficult.

In each step the teacher must be clear about what he or she intends to do and what the pupils must do. At no point should the pupils be wasting time in a lesson, not knowing what to do next.

The activities must be planned taking into consideration the objectives of the lesson.

Also, activities can be organised in groups, in pairs or as a whole class.

Some examples of teacher activities are: discussing, explaining, demonstrating, providing the necessary materials, and giving instructions and asking questions.

Some examples of pupils' activities are: listening, answering questions, discussing, experimenting, looking for information from diagrams or maps, drawing, modelling and answering written or oral questions.

During the lesson, the teacher should prepare some kind of activity so that the pupils can apply their new knowledge or the skills that they have learned during the lesson. The emphasis here is on 'learning by doing'.

4.2.3. Examples of Written Activities

Teacher guides pupils on how to fold a filter paper.

Teacher guides pupils to fold a rectangular paper along the diagonal to form two separate

triangles.

4.2.4. Conclusion/Closure of Lesson

The conclusion is the rounding off of the lesson satisfactorily; the way to conclude a lesson will depend on the nature of the lesson. A conclusion may involve:

- Going over the main points of the lesson through oral or written questions;
- Correcting some common mistakes made by the pupils while working;
- Emphasizing again the main message of the lesson, e.g. that of a new concept.

Collecting books and tidying up at the end of the lesson are obvious duties and are not to be regarded as activities to round off the lesson, especially, in practical lessons.

4.2.5. Application

In application, pupils must be made to see the relevance of Science and Mathematics in their everyday lives. This is when the knowledge gained by the pupils in the lesson can be put into use or applied in everyday life.

For example after a lesson on purification of water, pupils should be able to apply the knowledge acquired to either filter/boil or add alum, etc. to water which is not pure before using it. They should be able to apply what they have learnt to determine the appropriate unit of measure to use when measuring distances. Science and Mathematics must be viewed as fields that are open to them as careers, and also as a means to understand the world around them.

5. Assessment

5.1. Profile Dimension

5.1.1. Profile Dimensions for the Basic Level and Percentage Weight

Profile dimensions describe the underlying behaviour and changes in learners during teaching, learning and assessment. The profile dimensions for the basic level are shown in the table below.

Table 9: Profile Dimension for Basic Level[2]

SUBJECT	PROFILE	P1 – 3	P4 – 6	J.S.S
MATHS	Knowledge and understanding	40%	30 %	30 %
	Application of knowledge	60%	70 %	70 %
SCIENCE	Knowledge and understanding		20 %	30 %
	Application of knowledge		20 %	40 %
	Attitudes and Process skills		60 %	30%

Each dimension has been given a percentage weight that should be reflected in teaching, learning and assessment/testing. The weights indicated show the relative emphasis the teacher should give in the teaching, learning and assessment processes.

5.1.2. Explanation and Key Words of the Profile Dimension

The explanation and key words involved in each of the profile dimensions are shown in Table 10.

Table 10: Explanation and Key Words of the Profile Dimension

Dimensions	Identification of the dimensions	Levels of Learning
Knowledge	The ability to: remember, recall, identify, define, describe, list, name, match, memorise, mention, state, etc.	Lower Level
Understanding	The ability to: explain, summarise, translate, re-write, paraphrase, give examples, generalise, estimate, predict etc.	Lower Level

[2] Source: Teaching Syllabus for Mathematics (Primary School) and Teaching Syllabus for Integrated Science (Primary 4-6)

Dimensions	Identification of the dimensions	Levels of Learning
Application	The ability to: produce, solve, design, calculate, demonstrate, discover, outline, create, compare, differentiate, analyse, distinguish, determine, compose, apply rules, methods and principles to situations that are new and unfamiliar.	Higher Level
Process skills	It involves ways of carrying out investigations through: identifying a problem, planning, designing an experiment, observing, classifying, measuring, manipulating of objects, predicting, hypothesizing, fair testing (experimenting), recording, interpreting findings, generalizing, evaluating, communicating.	Higher Level
Attitudes	The desirable attitudes to be developed include: curiosity, perseverance, flexibility in ideas, reflection, questioning of events, thinking in an organized manner, self-confidence, respect for evidence, etc.	Higher Level

5.2. Test Items

How can we apply the concept of Profile Dimensions in the construction of test items (questions)? Teachers need to make sure that they place the appropriate weighting on each of the Profile Dimensions stated in the primary school syllabus.

5.2.1. Testing

When a teacher administers a test, the main goal is to provide valid, reliable and useful information concerning the pupils' performance. To achieve the above goal, the following steps must be followed.

- Set objectives that relate to the objectives that you set when teaching the topics. Note that the dimensions of teaching, learning and assessment at the basic school level are knowledge, understanding, application, process skills (and attitude).
- The number of questions (test items) that you set on a particular topic should relate to the importance and/or relevance of that topic.
- Select the appropriate type(s) of test to be used. The types of test include essay, multiple choice test, short-answer test, matching test and true/false test.
- Prepare the test items (questions). The number of questions set should relate to the test specification table you have made.

5.2.2. Specification Table

Specification table for a test in Integrated Science class BS 4 is shown in Table 11.

Table 11: Specification Table for a Test in Integrated Science Class (Topic Unit: Learning Objectives/Dimensions of Learning: Primary 4)

	Knowledge	Understanding	Process skills	Application	Total
1.Use of water.	1	1	3	1	6
2.Water Pollution	1		2		3
3.Air-properties			3	1	4
4.Keeping our surroundings clean	1		2	1	4
5.Sound Energy			2	1	3
Total number of questions	2	2	12	4	20
% of the questions (test items)	10%	10%	60%	20%	100%

5.2.3. Concept of Profile Dimensions and Set Test Questions (Test Items)

Examples of the use of the Profile Dimensions and Set Test Questions are shown in Table 12.

Table 12: The Profile Dimensions and Set Test Questions (Test Items) (Topic: Purification of Water: Primary 4)

Test Questions	Dimensions of Learning
Q1. State six uses of water.	Knowledge
Q2. Explain why boiled and filtered water is good for drinking	Understanding
Q3. Draw a labelled diagram showing a method of filtering water.	Process skills
Q4. You have been given a filter paper or a piece of clean cloth, two beakers, a funnel and dirty water. Using these materials describe an experiment that you will perform to get clean water.	Process skills and application of knowledge
Q5. You are staying in a guinea worm infested area. How will you make your water safe for drinking?	Application of knowledge

5.3. True/False objective test

Advantages

- Marking is very objective.
- The test is easy and quick to mark.
- It enables the teacher to have a scan of pupils' knowledge.
- Construction is relatively easy compared with multiple-choice test.
- It is usually short.
- There can be extensive sampling to cover a greater part of the syllabus.

Disadvantages

- It is susceptible to guessing as there are only two options to choose from.
- It encourages pupils to memorize facts without understanding.
- Test cannot be very valid.

Guidelines for preparing true/false test

- Statements used must be definitely right or wrong. (It should not be partly right and partly wrong).
- If a test is false that statement must be false by itself not because of certain minor phrases, which make it wrong. Items of controversy should be avoided.
- Sentences used should be simple and grammatically correct.
- Avoid lifting statements from textbooks.
- Do not use terms that will provide clues to the right answers. e.g. Usually, never, generally, may, etc.
- Do not follow a fixed pattern in the sequence of true/false items.
- Have approximately equal numbers of true/false items. This calls for a conscious effort to write balanced items.
- Items should not be arranged in a regular pattern. E.g. True statements should not always be followed by false statements and vice versa.

5.4. Completion Type Test

Introduction

This is the type of test, which requires the pupil to complete a statement by supplying missing words or phrases, numbers or symbols. No possible answers are listed as part of the item. Also, a diagram or map or an illustration is presented and the pupil is required to label the parts indicated. This test is used to measure knowledge of factual information. In writing a completion test item, it is best to use one blank space per item. Many blank spaces in a single item easily lead to confusion and guessing. The blank space should, as much as possible, be put at the end or near the end of the items. Items should be worded such that only one answer would be correct. Words, which serve as clues to the answers, should be avoided, e.g. “a”, “an”, “the”. The blanks for answers must be equal in length. Instructions must be clear, stating how the pupil should respond to the item and how to record the answer. For example:

1. An example of an insect which undergoes complete metamorphosis is ……
2. An example of a vegetable is ……..
3. 2 + 4 = □
4. 3 + 4 … 7 (Use “<”, “>”, or “=” to make the statement true)

Advantages of completion type objective test

1. It is a reliable method of testing and can be constructed to cover a greater part of the syllabus.
2. It is relatively easy to construct.

3. There is limited guessing element.
4. It can be used for a comprehensive assessment.
5. It has a valuable application in test situations presented in the form of maps, charts and diagrams in which the pupil is required to supply, in the spaces provided, the names of parts keyed by numbers or letters.

Disadvantages of completion type objective test

- The items often measure only factual knowledge of the pupil.
- It is sometimes difficult to weigh the answers to eliminate only one correct answer.
- It is less objective because it is sometimes difficult to depend on only one answer. The teacher has to decide whether an answer is close enough or "means the same".
- Teacher often uses too many blanks resulting in a vague and ambiguous puzzle to be solved by the pupils.

5.5. Matching Type Objective Test

Introduction

A matching type of objective test consists of a stem and a list of responses to match the stem. The stem and the responses can be in two columns (A and B or 1 and 2). Each column contains a word, number, symbol, sentence or phrase. The pupil is asked to match or associate an item, word, etc. in one column with a choice in the other.

Matching test is not well adapted to measure understanding. It is however, useful for checking precise information based on simple associations. It emphasises the ability to identify the relationship between two things such as events and dates, countries and their capital towns and their definitions, rules, tools, equipment facilities and their use, explanation of terms, etc. An example is shown below:

Match the words in column A with the statements in column B to make the sentences complete.

Example 1

Column A			Column B
1.	Glycogen	–	A compound made of carbon, hydrogen and oxygen.
2.	Carbohydrate form	–	A process whereby metabolic wastes are removed from the body.
3.	Skin	–	An example of an excretory organ.
4.	Protein	–	Glucose is stored in the liver as ……
5.	Excretion	–	An example of an excretory organ.
6.	Amino acids		

Advantages of matching type objective test

- Scoring is objective.
- Guessing is very much reduced.

- Scoring is easy.

Disadvantages of matching type objective test

- Its use is limited to tests of relationships or associations.
- Its construction is not all that easy. It requires some degree of skills to construct useful stems.
- It is sometimes difficult to obtain homogeneity.
- It turns to ask for trivial information.
- When the test is almost completed, the pupils can complete the final link by a process of elimination.

Guidelines for constructing matching tests

- Use homogeneous options and items, i.e. the statement and "answer" must be dealing with the same thing.
- The number of options must be greater than the test items (statements). This decreases the incidence of guessing by the pupils.
- The arrangement should be such that the short items should be the responses while the longer words or sentences should be the stem.
- The items in each set should be limited to about 5 or 6 and the responses should not be more than 10.
- Both the stem or premises and the responses should be on the same page.
- Instructions to pupils should be clear and definite and should specify the basis for matching.
- What each column represents should be stated clearly.

5.6. Multiple Choice Test

Introduction

This is the commonest type of objective test. In this test, a question is given with three or more responses and a pupil is required to select an answer from the given list of alternative answers. It is also possible to have several correct options and only one incorrect option, which is to be chosen from the list of alternatives. The first part, which poses the question, is referred to as the stem and the list of alternative answers is referred to as the options.

Example 1: (Multiple choice test)

The end product of protein digestion is?

1. Glycogen
2. Amino acids
3. Glucose
4. Fatty acids and glycerol

Example 2: (Multiple choice test)

2 x + 4 = 12, what is x ?

a) 4

b) 5

c) 6

d) 8

In the options, we have the true answer and the incorrect ones called distractions. The distractions should be plausible (seeming to be true or reasonable) as the true answer but they should not be true.

This type of objective test is the most difficult to design, it involves making three things.

1. A good question.
2. A good correct answer.
3. Three or four plausible but incorrect answers.

Advantages of multiple choice test

- It can be used to test a wider area of knowledge and also to test different types of complex skills other than true/false, supply or matching test types.
- Marking is very objective.
- The test is easy and quick to mark.
- It is easy to score by anyone using the scoring key.

Disadvantages of multiple choice test

- It is very difficult to construct, for instance, finding alternative plausible responses.
- It takes a longer time to construct the test items.
- Test occupies much space.
- Answers are open to some degree of guessing.
- It cannot be used to measure certain problem-solving skills.

Guidelines for constructing multiple choice test items

- The statement of the item must be carefully worded in order to avoid vagueness and different interpretations.
- Design distractors that are plausible but not obvious.
- Problems should be expressed clearly and accurately so that pupils know what to do.
- A fixed pattern in the positioning or placement of the correct option should be avoided.
- There should be no clue for the correct option, e.g. the use of ‘a’, “an”, “the” etc.
- Options should be vertically arranged instead of horizontal (A, B, C), since it facilitates easy reading and clarity of words. For example:

  A

  B

  C
- As much as possible items should be stated in positive terms rather than in negative terms. Negative terms such as “no” “not” etc. are usually overlooked by pupils. However, if statements with negative words are used, those words should be marked boldly, capitalized or underlined to make them conspicuous.
- The stem should be written at the appropriate language level for the pupils answering the items.

Guidelines for constructing stems for objective tests

- Decide on the proper type of test for the purpose to be served. If the purpose is to measure ability to recall facts rather than just to recognize them, then completion items rather than true/false or multiple choice should be used.
- A small portion of the items should be very easy and a few questions should be very difficult. Most items should be around 50% difficulty level.
- Stems should be clear and unambiguous (not to be understood in more than one way or of unclear meaning).
- Stems should be as brief as possible but most of the material should be contained in the stem. Usually the stem should be longer than the response.
- Generally, it is better to have positive stem and not negative ones. Negative stems can lead to misinterpretation unless carefully constructed.

5.7. Essay Type Test

Introduction

An essay type test is the one, which requires the pupil to compose in one or more sentences the answer to a question. It is one of the major tools for assessing pupils in our schools. It gives the pupil the chance to measure his thoughts. The test is generally used to assess learning outcomes such as the ability to recall, organize and integrate ideas into a logical and meaningful manner, and also the ability to express oneself in writing. It is also used to measure complex learning outcomes, which cannot be satisfactorily measured by objective tests. It allows for maximum response and encourages self-expression. It develops a variety of skills by calling upon pupils to use these skills. Skills like selection and use of relevant materials and organizing materials into coherent discussions and arriving at a conclusion.

Advantages of essay type test

- It is relatively easy to construct.
- It allows free expression and practice in organizing and arranging facts and arguments in an effective manner.
- The ability of the candidate to express him/her self in good language can be tested through the essay.
- It is more effective in testing achievements in certain types of skills, e.g. the ability to organize and relate information and the ability to select information that is related to particular information. (This merit does not apply automatically to all essay items)
- Guessing is reduced, if not completely eliminated.
- It motivates pupils to learn.

Disadvantages of essay type test

- Unless the marking of the test has been standardized it turns to be unreliable and halo effect sets in.
- It suffers from limited sampling. Sampling covers a limited area of the syllabus. One research finding shows that the essay calls for less than half the knowledge the average pupil actually possesses on the subject.
- The mood of the examiner at the time of marking may affect the pupil's grades. Factors like physical and mental condition of the examiner may tend to influence the marks awarded to the candidate.

- A pupil who has vocabulary handicap might be penalized.
- It gives pupils the chance to bluff or show off, writing irrelevant material to show that they know.
- It is time-consuming both for the teacher and the pupil. For the teacher, the reading, marking and grading require a lot of time if it is to be done well.
- There is variation in the difficulty level of questions answered by different pupils so that the marks do not have one basis for comparison.

Guidelines for improving on the construction of essay type test

- The sampling of materials taught should be as wide as possible. This can be done by increasing the number of questions asked and reducing the amount of discussion required on each. The type of response required must always be clearly indicated.
- Do not ask a question such as 'Describe the Digestive system'. The specific aspects of the digestive system to be described should be stated. For example: Describe what happens to a piece of meat eaten until it becomes part of the body.
- Each item should contain only one question. If there is more than one question in an item, they should be clearly indicated. So instead of 'What contributions do heredity and environment make to the pupil's growth and his performance in the classroom'? This could be better framed as 'What contribution do heredity and environment make on the following:
    1. A pupil's growth and development.
    2. A pupil's performance in the classroom.
- Indicate the time limit for taking the test.

Guidelines for constructing essay tests

- Prepare in advance a marking scheme. This is a list of answers, which are considered adequate for the objectives of the test.
- Assign a specific value to each essential part of the answer.
- Mark one question through all the papers before going to another question. This makes the scorer attend to only one set of criteria at a time in marking the script.
- Avoid generalizing performance on one question to another, predicting the pupil's performance on a subsequent question or item from performance on an item marked earlier.
- Use identification numbers to conceal the identity of the pupils before marking. This is to avoid a possible "halo" effect.

6. English as a Tool to Support Understanding of other Subjects

Introduction

One of the key objectives of the SBI/CBI is to assist teachers to be more efficient in the delivery of lessons. Since the medium of instruction is English, pupils must become proficient in both the use of English and in the knowledge of the subject. A major challenge to teachers in Ghana is how to develop pupils' subject knowledge using English language as a tool to support their understanding. This requires the teacher to teach English in the content area, which includes both the language specific to a subject and additional English language skills. For example, when teaching the Mathematics content that an obtuse angle is greater than 90 degrees, the teacher will not only have to teach the vocabulary item 'obtuse' but may also have to teach the use of the -er suffix to show comparison in the word greater.

Communication is an essential skill to be developed by teachers and learners. The ways in which teachers communicate knowledge and information to pupils will affect their understanding of the subject. In order to be most effective the teacher must be conscious of the pupils' level of language competency, including each pupil's skills in reading, writing, listening, speaking and overall understanding.

For example, there may be classroom situations where the pupils' understanding of concepts, such as a concept of Mathematics, is hindered by their lack of understanding of English. At the same time, pupils' understanding and competence in English can be improved through their practical experience of using English in lessons of other subjects.

Pupils need to use language in the classroom through two different opportunities:

1. They need to practice new language structures and terminology - repetition will provide good opportunity for practicing language skills.
2. They need the opportunity to develop their own thinking and understanding – this will not come from repetition alone but from opportunities to explain concepts in their own words, from asking their questions and from discussions.

6.1. English as a Tool to Support Understanding (General)

6.1.1. Language and lesson activities

Pupils need to have the opportunity to discuss in groups – to share ideas, to develop ideas and to improve their language communication skills, to clarify and organise their thoughts and to correct misunderstandings among themselves.

Instructional activities should maximize opportunities for language use. Opportunities for substantive, sustained dialogue are critical to challenging pupils' ability to communicate ideas, formulate questions, and use language for higher order thinking. Each pupil, at his or her own level of proficiency, should have opportunities to communicate meaningfully in this way.

Instructional tasks should involve pupils as active participants. Pupils contribute and learn more effectively when they are able to play a role in structuring their own learning, when tasks are oriented toward discovery of concepts and answers to questions, and when the content is both meaningful and challenging.

Instructional interactions should provide support at each pupil's level of understanding. Teachers should ensure that pupils understand the concepts and materials being presented. This includes providing support for the pupils' understanding of instructions and the subject concepts presented in English.

Problems in translation The teacher should consider carefully the words she/he uses when translating between the local language of the pupils and the English language of the classroom. Some words will not have a direct translation into the local language. For example, there may not be a single word for "symmetrical" or for "electricity".

6.1.2. TIPS for Using English as a Tool to Support Understanding of other Subjects

Teachers must learn to **talk less** AND **listen to pupils more**

Teachers must improve their questioning skills:

- MORE open questions requiring explanation from the pupils
- Note: an open question has more than one answer
- FEWER close questions with YES/NO answers or only one correct answer. E.g. 2 +3 = 5
- Pupils must be encouraged to ask questions
- ALL PUPILS must be encouraged to speak in the classroom

Teachers should:

- Use simple, short and clear English phrases as often as possible.
- Use a range of common and useful classroom phrases regularly – for example:

  "What did you do next?"

  "What happened next?"

  "What does … mean?"

  "How did you work out the answer?"

  "Please tell us in your own words"

If the teacher uses a few common questions, phrases and instructions regularly in the classroom the pupils will become familiar with what is expected of them and they will be able to anticipate what the teacher wants them to do.

Use of the Local Language used at home

1. Give clear, simple instructions - check for understanding using one of these strategies:
   - First, give the instructions in English. If necessary repeat the instructions in the pupils' local language and then again in English to reinforce the understanding of English;
   - Write the instructions on the blackboard and ask the pupils to read or copy the instructions;
   - Ask one or two pupils to repeat the oral instructions you have given.
   - Pupils in the class who are knowledgeable in the subject or in the use of English may be able to explain to other pupils in their local language to help their understanding.

2. If necessary, when explaining or clarifying a difficult concept and when introducing a new concept, give a simple translation in the local language to help pupils' understanding of the English explanation but
   …. DO NOT make this a habit or the pupils will learn to expect this.
   …. DO explain in English first and repeat the English explanation later.

3. Check pupils' understanding by occasionally asking them to explain in their local language.

4. Ensure that you are consistent in your use of language. For example:
   - use the same vocabulary on the blackboard as pupils will read in their books;
   - use the same words to give explanations and to ask questions both orally and in written form;
   - use the same terminology in tests and exercises as pupils will have heard and read in the lesson and in their books.

6.1.3. Checking Understanding

Answering Questions

In most classrooms the teacher asks the questions and the pupils give the answer, sometimes in unison and sometimes individually. Some pupils are never asked to answer a question, may be because the teacher is sure the pupil will not know the correct answer.

How can we ensure that all pupils have the opportunity to answer questions in the classroom?

Eliciting Answers

The teacher needs to develop the skills of asking open questions, leading the pupils towards giving an explanation in their own words. This helps the pupils to develop their understanding of the concept and reveals to the teacher any problems in their level of understanding.

For example, in the Science classroom, questions such as the following can be asked:

- What do you think will happen?
- Why did that happen?
- What do you think would happen if …. ?

For example, in the **Science or Mathematics** classroom, when using pictures and diagrams:

- What can you see in the diagram?
- What does the diagram show us?
- Explain this part of the chart to the class.
- Describe in your own words what you see in this picture.

For example, in the **Mathematics classroom**:

Tell us how you worked out this answer?

- What did you do next?
- What can you tell us about this shape?
- What does the word "angle" mean?

If the teacher asks the class "Do you understand?" - this is NOT a good question. Why?

In addition to being aware of the questioning skills she/he is using, the teacher should also develop the skill of listening to the pupils' answers and responding effectively. The teacher's response will be important in developing pupils' confidence in the subject and in their use of language.

Marking Pupils' Written Work

Here are three key questions relating to the development of language when marking pupils' work:

Table 13: Tips for Marking

QUESTION	POINTS FOR THE TEACHER TO THINK ABOUT
Who marks the pupil's work?	If the teacher marks the pupil's work she/he should ensure that she communicates with the pupils to overcome any misunderstandings they may have, checking and reinforcing language understanding.
If there is a mistake how is the mistake corrected?	Is the misunderstanding conceptual or is it a problem with understanding the written language? Will there be a language problem in trying to correct any mistakes the pupil has made? If the problem is due to language difficulties what strategies can the teacher use to correct this?
Does the pupil check her answers – before and after the work is marked?	Pupils must be encouraged to check their work before it is marked and again after it is marked. In this way, they can read carefully and correct any mistakes they notice before the work is marked. When the work is marked and returned to the pupils, they can check again to see where they had some misunderstanding. This simple checking task will help the pupils to develop their language by re-reading for understanding.

6.1.4. Examples of Language Activities

Language Activities and Roles of the Teacher and the Pupils

There are various language activities which the teacher can use to encourage pupils to gain better understanding of the topics. These activities will need to be chosen carefully to suit the topic. Both teachers and pupils will need time to become used to some of these activities. For example, pupils will not be sure of what is expected of them when suddenly asked to discuss a question in groups if they have never worked in this way before. The teacher will need to plan, organize and introduce the activity carefully. Demonstration lessons can be used to introduce some of these activities during SBI/CBI programmes.

Table 14: Roles of Classroom English

THE TEACHER'S ROLE	THE PUPIL'S ROLE
– Leads and encourages classroom discussion	– Participates actively in classroom discussion
– Provides explanation	– Listens to the explanations of the teacher

THE TEACHER'S ROLE	THE PUPIL'S ROLE
– Uses demonstration to illustrate concept and language	– Observes the demonstration – listening and asking questions for improved understanding
– Gives clear, simple instructions to guide the pupils	– Listens to and follows instructions given by the teacher
– Asks questions to encourage thinking and to test understanding (written and oral)	– Answers questions the teacher asks (written and oral)
– Answers questions the pupils are encouraged by the teacher to ask (oral)	– Asks the teacher and other pupils questions to clarify thinking (oral) –
– Listens to the pupil's discussion and answers to questions	– Listens to the teacher and to other pupils in discussion and gives answers to questions
– Uses class books and wall charts to encourage pupils to read for information	– Reads the information in class books and wall charts

Notes:

Which of these activities do you do most often in your classroom?

Which activities do the pupils in your classroom do most often?

Are there any of these activities that NEVER happen in your classroom?

How can you change this?

Lesson Planning

When you are planning a lesson, think carefully about the language challenges that may arise in the lesson. A common problem is confusion between vocabulary used in the classroom and the language of everyday life. For example "What do you mean?" may be confused with calculating the mean score in data handling in Mathematics. The following steps should be included in the lesson:

Step 1 Explain the meaning of new vocabulary

Step 2 Give examples of how to use the new vocabulary and when to use it

Step 3 Give the pupils the opportunity to practice saying and spelling the new vocabulary

FIVE WORDS A DAY : A simple way to practice new vocabulary is to start or end each day with class practice. Write five words on the blackboard relating to the present topic. The pupils have to think of a sentence for each word. Choose five pupils – each one tells the class one of their sentences. Choose different pupils and different words each day so that all pupils have a chance to share their sentences with the class.

6.1.5. Some Ideas to Help Pupils to Explain in their Own Words

The pupils will able to explain their understanding very well in their local language but we want to encourage them to develop their understanding in English which will be much more difficult for them. How can the teacher help pupils to explain in their own words AND in English?

- Prompt with one or two words to help the pupils if they are struggling to find the correct word.
- Use simple structures and use repetition of phrases that the pupils can easily learn to use.
- Encourage pupils to help each other when they are struggling to explain in English.
- Give the pupils the opportunity to ask for help, for example, in their local language they can ask "How do you say …… in English?"
- Allow the pupils to make a few mistakes in their use of English when they are trying to express an idea.

6.1.6. Some Practical Ideas for Teachers

1. Technical terminology and simple definitions:
   - Introduce new terminology by giving the pupils a simple explanation
   - If the definition is not clear in the textbook, write the definition on the blackboard and ask the pupils to copy it into their exercise books. They can put a text box round the definition and include a simple illustration where relevant.

2. **Use a combination of group work and individual work**. It is important to point out that second language learners develop and improve their language skills through group work activities, working in small groups where they can share ideas and learn from each other. Group work enables pupils to use language to talk about the tasks of a subject at hand while they solve non-routine problems. Setting individual work ensures that all pupils process lessons at their own rate of learning.

3. **The classroom can be enriched with extra attention to language**. Charts with important vocabulary and language structures should be displayed on the walls, along with writing by the teacher and pupils.
   - regularly revise the new vocabulary and understanding of related concepts
   - make a class dictionary in which to record new vocabulary

4. **The teachers should be aware of the language level of their pupils and also know their standard of the subjects through periodic assessment.** The teacher should be aware of appropriate levels of reading and writing skills and should know some basic language teaching methodologies such as the use of repetition and how to balance the use of the local language with English.

5. **Make the lessons as relevant to the pupils' every day experiences as possible**. Use every day examples, real objects, resources from the local environment and activities in the local community.

6. Listen carefully to pupils' use of language. Use the following teaching techniques:
   - restate complex sentences as a sequence of simple sentences;

- avoid or explain use of idiomatic expressions;
- restate at a slower rate when needed, but make sure that the pace is not so slow that normal intonation and stress patterns become distorted;
- pause often to allow pupils to process what they hear;
- provide specific explanations of key words and special or technical vocabulary, using examples and non-linguistic props when possible; use everyday language.
- provide opportunity for pupils to practice and use new vocabulary in oral and written form.

6.2. English to Support Understanding of Science and Mathematics

In this section, we will consider some strategies for using **English as a tool to support the understanding of Science and Mathematics**. We will also address some of the main language challenges in the Mathematics and Science classrooms.

6.2.1. Language Activities that pupils generally find most difficult in Science and Mathematics lessons

Here are some specific examples of Mathematics and Science language which pupils might find problematic.

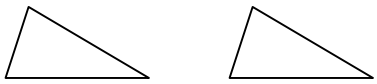
a) Confusion between mass and weight:

How can the teacher help pupils to understand the difference?

b) Difficulty with definition of technical language:

- How would you explain technical terms such as "congruent" in simple language for the pupils to understand?

Congruent means:



- Exactly the same size and shape
- Two are congruent if they fit exactly on top of each other

c) Some examples of vocabulary structures pupils will need to learn:

–	nought	zero	nothing	nil
–	add	sum	plus	
–	take away	subtract	minus	
–	approximately	approximation	approximate	
–	multiply	multiplication multiples	multiplied by	
–	divide	division		
–	centimetre kilometre	metre	millimetre	
–	great	greater	greatest	
–	less	fewer	least	
–	hundred	hundredth		
–	rotate	rotation		
–	symmetry	symmetrical		
–	triangle	triangular		
–	vertex	vertices		
–	conductor	insulator	insulation	
–	vapour	vaporise	evaporate	
–	-		evaporation	
–	live	alive life	living	
–	mature	immature	maturity	
–	fertile	fertilise fertility	fertilisation	
–	health	healthier healthiest	healthy	
–	nutrients	nutrition		
–	hygiene	hygienic		
–	pollute	pollution pollutes	polluted	
–	pollinate	pollination pollinated	pollinator	
–	reproduce	reproduction	reproductive	
–	electric	electricity	electrical	
–	magnet	magnetism	magnetic	

d) All new vocabulary must be taught in context:

Pupils can be introduced to the new structures using sentences relating to the topic they are studying. They need to be given plenty of opportunity to practice each new structure in its correct context.

6.2.2. Language Teaching Activities to Support Understanding of Science and Mathematics

Some basic language teaching activities are illustrated below which are simple to make and which can be modified to correspond with any topic:

Complete the sentence / Fill in the blanks

The outer layer of the earth is called the earth's …..….. It is made of …..... .

Cool air is …… than warm air.

A square has … sides and a …… has 3 sides.

A cuboid has …. faces, 12 ……..…. and 8 ……

Jumbled letters

When you heat water, it changes into U A V O P R

I R G Y V A T is a force that pulls things towards the earth.

The E T E P I R M R is the sum of the lengths of all the sides of a shape

I N T M T R E C E S equals 1 E E M R T

Matching sentences - write one part of each sentence on strips of paper and distribute one to each pupil. Each pupil has to find the pupil who has the other part of their sentence and read the sentence aloud.

438	the space between two straight lines which meet.
three fourths	The distance all the way round a circle.
an angle	four hundred and thirty eight.
circumference	¾.

Soil is made up of	smoke dust and gases.
Boiled water is almost free of	dissolve in water.
Air can be polluted from	particles of stones and other materials.
Solids such as sugar and salt	disease causing organisms and impurities.

Putting sentences in the correct sequence

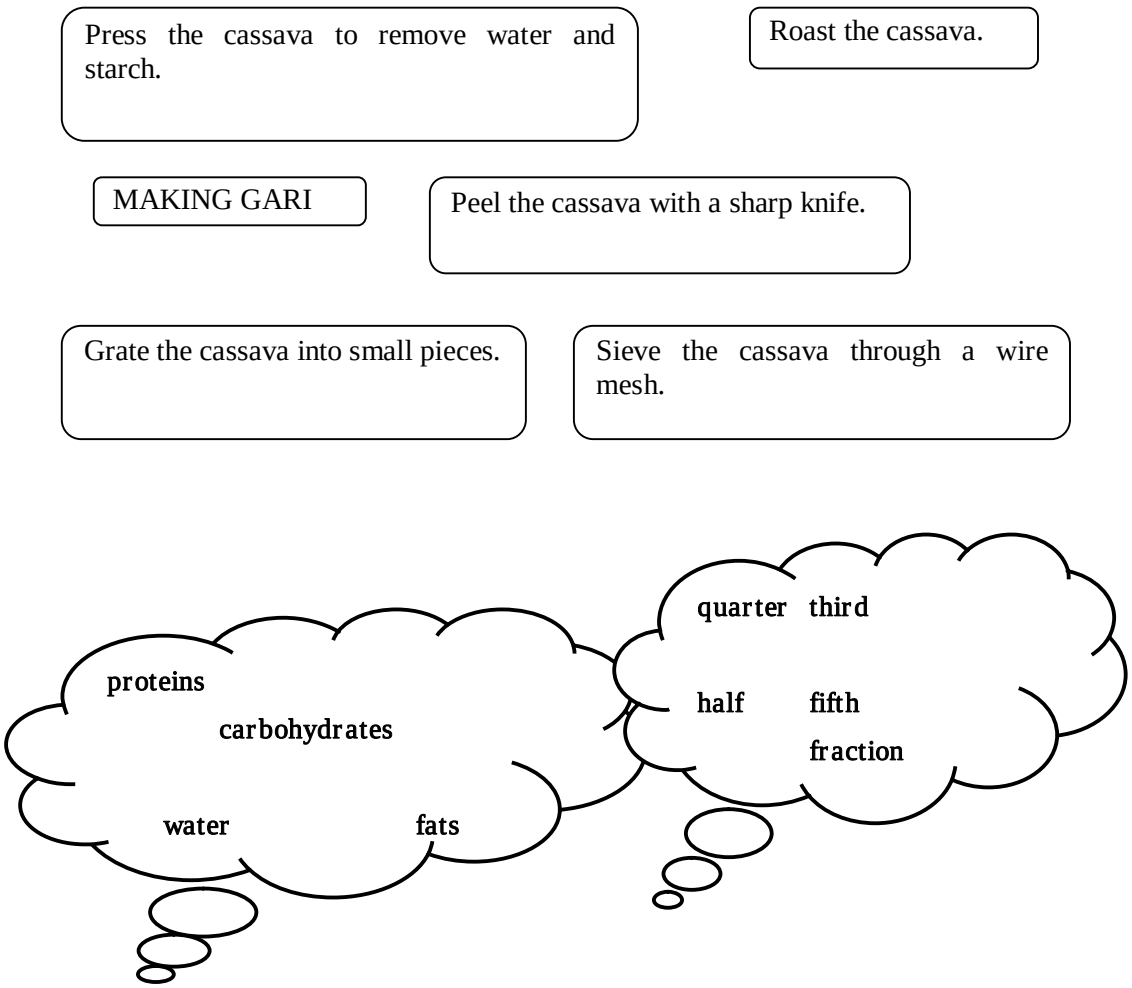


Figure 10: Families of Words

Module 5: Sample Lesson Plans in Mathematics

Users:

All personnel at school level

Objectives of this Module:

Module 5 comprises sample lesson plans of **challenging topic**s in Mathematics.

The module also provides a concise explanation of challenging topics at the beginning of the module. It briefly discusses the identification of challenging topics.

All the sample lesson plans are in accordance with the Ministry of Education (MOE) MATHEMATICS SYLLABUS FOR PRIMARY SCHOOL in Ghana.

The module has 2 types of sample lesson plans, type A and type B. Sample lesson plans of Type A consist of 5 parts: **lesson overview, lesson plan, teaching hints, use of chalkboard** and **English as a teaching tool**. On the other hand, sample lesson plans of Type B consist of 2 parts only: **lesson plan** and **English as a teaching tool**.

The lesson overview is made up of introduction, objectives of the topic and the lesson, Relevant Previous Knowledge (R.P.K.) and details about the class. "Introduction" illustrates the importance and relevance of the lesson to a real life. All the "objectives" are taken from the syllabus. "R.P.K." states relevant previous knowledge that pupils are expected to have. "Details about the class" describes the current situation of the class in terms of pupils' general information, academic progress, interests and attitude towards the subject. Further explanation about these can be found in Module 4 (4. Lesson Plan).

The lesson plan (sometimes also called lesson note) is included both Type A and Type B. The format of the lesson plan is the same as the standard lesson plan that Ghana Education Service (GES) provides.

The sample lesson plans of Type A also contain "lesson plan with teaching hints" on the next page of the standard lesson plan. The lesson plan with teaching hints is the same as the standard lesson plan on the previous page except for showing the speech blobs (rounded rectangular shapes) on the lesson plan. The speech blobs suggest where each of the teaching hints can be used.

The teaching hints provide suggested teaching approaches. It is designed that each of the teaching hints elaborates how to deliver a particular teaching activity (e.g. introduction, Activity 1,2…) in the development of a lesson. Because many of these teaching activities are linked with the core points of the lesson, successful delivery of the teaching activity should lead to a sound understanding of the core points.

The teaching hints deal with mainly general teaching approaches and questioning skills for particular teaching activities. The general teaching approaches describe how the teacher can lead pupils to the core points through the activities. When giving some mathematical activities in a classroom, the teaching approach explains how to conduct the activities, paying special attention to the process skills of Mathematics. The questioning skills should also help the teacher to facilitate pupils to reach a good understanding of the core points. It is recommended that teachers develop better teaching approaches and questions for the lesson and other lessons once they get the sense of the teaching hints discussed.

The use of chalkboard shows a suggested chalkboard plan. Well-organized chalkboard helps pupils understand what they are learning in the lesson. Teachers need to consider how to use and organize chalkboard, and this part can help them consider their planning chalkboard.

The section of **English as a teaching tool** suggests effective use of English language in the Mathematics lessons. The section gives example usages of English at particular activities. By using the actual content of the sample lessons, it helps pupils to understand Mathematics content better. It should be noted that a section of Module 4 highlights the use of English language as a teaching tool for other subjects, with a general and rather theoretical explanation of the use of it.

Use of Modules 5 for SBI/CBI demonstration activity (lesson)

CL and teachers can simply use some of the sample lesson plans for their SBI/CBI. They can also develop their own lesson plan of a challenging topic using one of the samples as a basis. Once CL and teachers have become familiar with the sample lesson plans and their teaching and learning strategies, it is strongly recommended that CL and teachers start creating their own original lesson plans of challenging topics.

Adding Lesson Plans developed by CL and teachers

Module 5 should be built-up by adding more sample lesson plans. CL and teachers must be encouraged to develop these lesson plans. CL and teachers have opportunities to develop lesson plans of challenging topics when preparing their SBI/CBI. Besides, CL can improve lesson plans when discussing the challenging topics with other CLs in CL Sourcebook Training.

Some of the lesson plans developed by CL and teachers will be added to the modules.

Table of Content:

Version:	1.00

Identification of Challenging Topics

Introduction

Some teachers in primary schools think that some topics are difficult or challenging to teach. They call the topics **challenging topics**. The teachers claim that the topics require subject teachers or specialists to teach them. However, with adequate preparation, teaching these topics should not be problematic. It is a matter of preparation not qualification. A little bit of extra effort and time to prepare a lesson makes a big difference and helps teachers to improve their lessons greatly.

This section provides some useful information about challenging topics for CLs and teachers. It helps to identify challenging topics.

Challenging Topics in Mathematics

The following are some examples of challenging topics in Mathematics. These are based on opinions gathered from serving teachers at the primary school level.

> Operation of Fractions, Measurement of Area, Investigation with Numbers, Shape and Space, Collecting and Handling Data

It seems that the reasons why teachers perceive some topics as challenging vary from teacher to teacher. However, some typical reasons are identifiable. For example, one of the reasons is that challenging topics are seen to be abstract because they are not seen in real life situations. Another reason can be that challenging topics lack relevant curriculum materials that teachers can use as resource materials. The following are some of the reasons some teachers gave for regarding certain topics as challenging.

- The tendency to teach the topics in abstract.
- The lack of basic knowledge in Mathematics by teachers.
- Absence of relevant materials (TLMs) in the initial stages/introductory stage of the topics
- Reluctance of some teachers to use the relevant curriculum materials and other references in preparation and delivery of the topics.
- Unwillingness on the part of the teachers to approach colleagues with expert knowledge on the content and methodology of Mathematics.
- The lack of relation between Mathematics and the pupils' environment or everyday life.
- The lack of practical activities (little involvement of pupils).
- Insufficient exercises given to pupils to practise.
- Negative attitudes towards Mathematics, as a result of Mathematics phobia.
- Large class size which does not make it possible for activities to be smoothly carried out.

Summary

The challenging topics are seen to be abstract in nature. Besides, there are no teaching/learning materials and relevant curriculum materials to support teachers to teach such topics. Some teachers don't use appropriate teaching methodology, and large class size makes the use of the activity method of teaching difficult.

These problems can be overcome by adopting good strategies in the teaching/learning processes.

The fundamental principle that underlies the In-Service Training (INSET) programme is that teachers learn effectively through sharing, implementation and discussion of a lesson with their colleagues. Thus, the CL and teachers should utilize the opportunities for lesson implementation and post-lesson discussion at SBI/CBI and CL sourcebook training to treat challenging topics.

Sample Lesson Plans (TYPE A)

Lesson 1: Multiply a Fraction by a Fraction (Primary 6)

1. Lesson overview
2. Lesson plan
3. Teaching hints
4. The Use of Chalkboard
5. English as a teaching tool

Lesson 2: Measurement of Area (Primary 4)

1. Lesson overview
2. Lesson plan
3. Teaching hints
4. The Use of Chalkboard
5. English as a teaching tool

Lesson 1: Primary 6 Multiply a Fraction by a Fraction

1. Lesson Overview

Introduction

Multiplication of fractions is one of the most difficult topics at the primary level, not only for pupils but also for teachers. The reason seems to be that it is taught just by rote learning (memorizing the formula of the multiplication) without understanding the meaning of multiplication of fractions based on their experiences or contexts in everyday life.

In this section, we are going to see a sample lesson plan on multiplication of fractions which attempts to help pupils at Primary 6 understand the meaning of multiplying two fractions relating to the concept of the area of a rectangle.

General Objectives of the Topic (Operations on Fractions in Primary 6)

The pupil will be able to:

- add or subtract two given fractions with different denominators
- find the result of multiplying two given fractions
- find the result of dividing a given whole number by a given fraction.
- solve word problems using 4 operations (addition, subtraction, multiplication, division) of fractions.

Specific Objectives of the Lesson (Multiply a fraction by a fraction)

By the end of the lesson, pupils will be able to:

- multiply two given fractions
- solve word/story problem involving multiplication of fractions

Table 1: Class and Unit that this topic can be found

Class	Unit
Primary 2	Unit 2.8:Fractions
Primary 3	Unit 3.4: Fractions I Unit 3.11: Fractions II
Primary 4	Unit 4.6: Fractions I Unit 4.9: Fractions II
Primary 5	Unit 5.11: Operations on Fractions
Primary 6	**Unit 6.2: Operations on Fractions** **6.2.7 Multiply a fraction by a fraction (←The lesson plan is for this unit!)**

Relevant Previous Knowledge (R.P.K.)

(Topics covered in various classes)

Primary 2

- 1/2 (one-half) and 1/4 (a quarter or one-fourth)

Primary 3

- halves, fourths, eighths, thirds, and sixths
- comparing fractions

- fractions on the number line

Primary 4

- writing different names for a fraction
- comparing unit fractions
- relating a fraction to the division of a whole number by a counting number
- addition and subtraction of fractions with different denominators
- relating decimal names to tenths and hundredths and locating them on the number line
- relating decimal names and percentage to hundredths

Primary 5

- multiplying a whole number by a fraction
- finding a fraction of a given whole number
- dividing a fraction by a counting number
- renaming simple fractions as tenths and hundredths and writing their decimal names
- comparing two fractions with different denominators
- changing simple fractions to hundredths and writing their percentage names, and vice versa

Primary 6

- ordering three fractions according to size in ascending or descending order
- addition and subtraction of fractions with different denominators

However, the teacher should not assume that all pupils in the class have a good understanding of the above. It is always important to pay attention to the individual needs of pupils

Details about the Class

The "Details about the Class" explains the current situation of the class in terms of pupils' general information, academic progress, interests in the subject and attitude towards the subject.

(Refer to **4.1.3. Details About the Class** of Module 4 for further explanation.)

(This is an example)

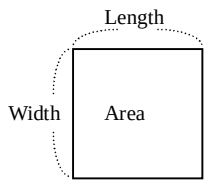
The class consists of 30 pupils (16 are boys and 14 are girls). In a previous investigation on pupils' attitude toward Mathematics, 9 pupils answered that they liked Mathematics, 9 answered in the negative. A readiness test indicated that 3 pupils could give the meaning of fractions. They could also add and subtract two given fractions including those with different denominators. It was also found that 12 pupils could add and subtract two fractions if the denominators are the same, but could not if they are different. Among the rest of the pupils, 3 could not order fractions. Also 12 pupils were able to perform calculations involving multiplication of fractions.

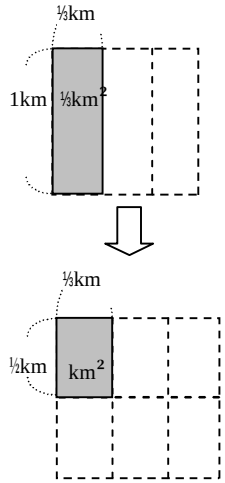
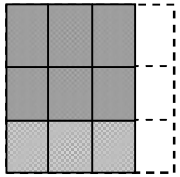
Half of the pupils could appreciate the value of Mathematics and have a positive attitude toward its study.

2. Lesson Plan

MULTIPLY A FRACTION BY A FRACTION

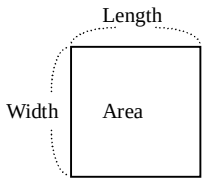
SUBJECT: Mathematics **REFERENCES**: Primary Mathematics 6 (Unimax Macmillan)
CLASS: Primary 6 **Details about the Class:** 9pupils (30%) can understand the meaning of fractions, but 9 pupils (30%) cannot.

DATE/ DAY/TIME/DURATION	TOPIC/SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE REMARKS
3 Oct. 2006 Tuesday 10:00am - 11:00am 60 minutes	UNIT 6.2 TOPIC: Operations of fractions SUB-TOPIC: Multiply a fraction by a fraction	OBJECTIVE(S) By the end of the lesson, the pupil will be able to: 1.Multiply two fractions using the idea of area of a rectangle 2.Multiply a fraction by a fraction R.P.K. Pupils can multiply fractions by whole numbers	TLMs: Cut-out shapes Keywords/Vocabulary List: Fraction, Denominator, Numerator INTRODUCTION (5min): Teacher gives pupils the following problem. Mr. Adamu had a plot of land in the shape of a square of side 1 km. Fati's father bought $\frac{1}{3}$ (*1) of the land and gave $\frac{1}{2}$ (*2) of it to Fati. We want to find out the fraction of the plot Fati got. ACTIVITIES: Step 1 (3min) Teacher gives pupils square sheets of paper to represent the plot of land.	Core Point. 1 (Area) =(Length)×(Width)  	

			Step 2 (7min) Teacher guides pupils to fold the paper into 3 equal parts vertically and shade a third of it. Step 3 (10 min) Teacher guides pupils to fold the sheet again horizontally into halves and shade one half of it in another way. Step 4 (5min) Pupils identify the rejoin with double shading as Fati's portion of the plot that is $\frac{1}{2}$ of $\frac{1}{3}$. Step 5 (5 min) Teacher gives another similar problem as in Step 1. In this step, (*1) is $\frac{3}{4}$ and (*2) is $\frac{2}{3}$. Step 6 (10 min) Pupils fold the square sheet to solve the second problem. Step 7 (10 min) Teacher asks the pupils to count and describe the meaning of the numerator and the denominator of the answer. CONCLUSION (5 min): Teacher and the pupils reach the conclusion on how to calculate the multiplication of two fractions.	Core Point 2  Core Point 3  Core Point 4 $\frac{\bigcirc}{\triangle} \times \frac{\diamond}{\star} = \frac{\bigcirc \times \diamond}{\triangle \times \star}$	Find the result of multiplying two given fractions Find the result of multiplying two given fractions In multiplying, find the product of the numerators and divide by the product of the denominators.

Lesson Plan with Hints

The lesson plan below shows speech blobs (rounded rectangular shapes) that indicate hints for the teaching approach. The hints for the teaching approach deal with specific skills in the lesson delivery and they are explained in detail on the following pages. The position of each balloon indicates where each of the hints can be used.

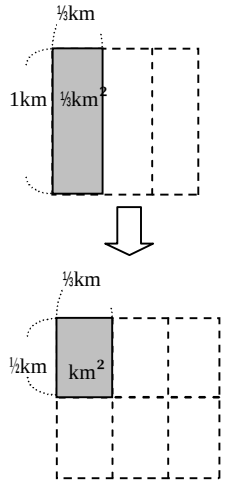
DATE/ DAY/TIME/DURATION	TOPIC/SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE REMARKS
3 Oct. 2006 Tuesday 10:00am - 11:00am 60 minutes	UNIT 6.2 TOPIC: Operations of fractions SUB-TOPIC: Multiply a fraction by a fraction	OBJECTIVE(S) By the end of the lesson, the pupil will be able to: 1.Multiply two fractions using the idea of area of a rectangle 2.Multiply a fraction by a fraction R.P.K. Pupils can multiply fractions by whole numbers	TLMs: Cut-out shapes Keywords/Vocabulary List: Frac INTRODUCTION (5min): Teacher gives pupils the following problem. Mr. Adamu had a plot of land in the shape of a square of side 1 km. Fati's father bought $\frac{1}{3}$ (*1) of the land and gave $\frac{1}{2}$ (*2) of it to Fati. We want to find out the fraction of the plot Fati got. ACTIVITIES: Step 1 (3min) Teacher gives pupils square sheets of paper to represent the plot of land.	Core Point. 1 (Area) =(Length)×(Width)  	

Hints for **Introduction**

Hints for **Step 1**

Step 2 (7min)
Teacher guides pupils to fold the paper into 3 equal parts vertically and shade a third of it.

Core Point 2

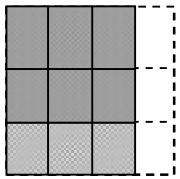


Hints for
Step 4

Step 3 (10 min)
Teacher guides pupil… halves and shade one half of …

Step 4 (5min)
Pupils identify the rejoin with double shading as Fati's portion of the plot that is $\frac{1}{2}$ of $\frac{1}{3}$.

Core Point 3



Find the result of multiplying two given fractions

Find the result of multiplying two given fractions

Hints for
Step 6

Step 5 (5 min)
Teacher gives another similar problem as in Step 1.
In this step, (*1) is $\frac{3}{4}$ and (*2) is $\frac{2}{3}$.

Step 6 (10 min)
Pupils fold the square sheet to solve the second problem.

Hints for
Step 7

Step 7 (10 min)
Teacher asks the pu… e numerator and the den…

Hints for
Conclusion

Core Point 4

$$\frac{\bigcirc}{\triangle} \times \frac{\diamond}{\star} = \frac{\bigcirc \times \diamond}{\triangle \times \star}$$

In multiplying, find the product of the numerators and divide by the product of the denominators.

CONCLUSION (5 min):
Teacher and the pupils reach the conclusion on how to calculate the multiplication of two fractions.

3. Teaching Hints

The discussion that follows is the suggested teaching approaches for presenting the lesson whose lesson plan can be found on the previous page.

Hints for Introduction

Questioning of Skills for Introduction

By way of introduction, the teacher can ask questions that check the pupils' R.P.K.

Example

T) "Given the length and the width of a rectangle, how do you calculate the area?"
T) "If you are given half of 6 square kilometres, how do you calculate the area you are given?"

Hint for Step 1: For the first core question:

Mr. Adamu had a plot of land in the shape of a square of side 1 km. Fati's father bought $\frac{1}{3}$ (*1) of the land and gave $\frac{1}{2}$ (*2) of it to Fati. We want to find out the fraction of

The teacher asks for the intermediate answer from the pupils, that is $\frac{1}{2}\times\frac{1}{3}$. In this step, it is enough for the pupils to understand that the operation on the two numbers must be multiplication.

Approach to Step 1

In the previous lesson, pupils learned multiplication of a fraction by a whole number

E.g. $\frac{1}{2}$ of $8 = \frac{1}{2}\times 8 = \frac{8}{2} = 4$

By recalling this step, let the pupils notice that $\frac{1}{2}$ of $\frac{1}{3}$ is $\frac{1}{2}\times\frac{1}{3}$.

Questioning Skills for Step 1

After presenting the first main question, that is, "how many square kilometres of the land did Fati get?" the teacher asks:

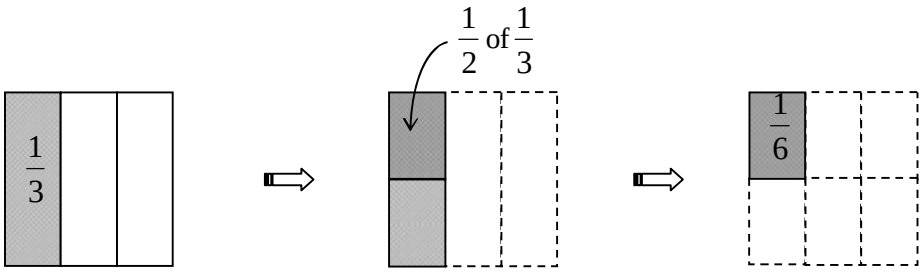
Example

T) In stead of the number 6, Fati was given $\frac{1}{3}$ square kilometres.
"How do you calculate the area?"

Hints for Step 4: Let the pupils notice that the denominator of the answer is 6 and the numerator of the answer is 1.

Approach to Step 4

(1) The teacher demonstrates paper folding and shading to get $\frac{1}{2} \times \frac{1}{3}$ as follows



Step 1
Fold into three equal parts and shade one part.

Step 2
Fold the shaded part into two equal parts and shade one of the two equal parts.

Step 3
Compare the double shaded part to the original whole.

(2) Pupils will follow the above step and consider the meaning of the shaded part.

Questioning Skills for Step 4

After demonstrating how to fold the paper, the teacher asks pupils:

Example

T) "Can you shade the part that Fati was given?"
T) "What is the fraction that describes the given part in relation to the whole area?"
T) "What is the denominator of $\frac{1}{6}$?"
T) "What is the numerator of $\frac{1}{6}$?"

Hints for Step 6: For the second core question:

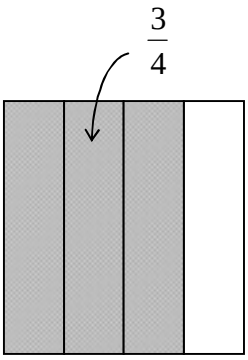
Mr. Adamu had a plot of land in the shape of a square of side 1 km. Fati's father bought $\frac{3}{4}$ of the land and gave $\frac{2}{3}$ of it to Fati. We want to find out the fraction of the plot Fati got.

Let the pupils notice that

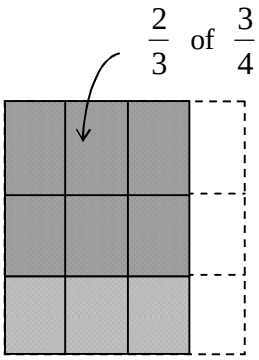
1. the intermediate answer is $\frac{2}{3}\times\frac{3}{4}$
2. the denominator of the answer is 12 and the numerator of the answer is 6.

Approach to Step 6

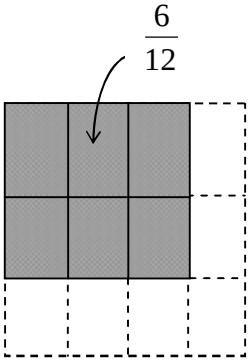
Let the pupils fold a sheet of paper to get $\frac{2}{3}\times\frac{3}{4}$.



Step 1
Fold into four equal parts and shade three parts



Step 2
Fold the shaded part into three equal parts and shade two of the three equal parts.



Step 3
Compare the double shaded part to the original whole.

Questioning Skills for Step 6

When the pupils finish the second main activity, the teacher asks:

Example

T) "Can you shade the part where Fati was given?"
T) "What is the fraction that describes the given part in relation to the whole area?"
T) "What is the denominator of $\frac{6}{12}$?"
T) "What is the numerator of $\frac{6}{12}$?"

Hints for Step 7:

Questioning Skills for Step7

To confirm the number which appeared in the solution, the teacher asks:

Example

T) "How many individual parts are there in the area of the first question?"
T) "How many individual parts are there in the area of the second question?"
T) "Is there any relation between the denominator and the individual parts?"

Hints for Conclusion:

Let the pupils realize that the multiplication of two given fractions is equal to a fraction whose numerator is the multiplication of the two numerators of the given fractions, and denominator is the multiplication of the two denominators of the given fractions.

Approach to Conclusion

1) The teacher confirms that $\frac{1}{2}\times\frac{1}{3}=\frac{1}{6}$ and $\frac{2}{3}\times\frac{3}{4}=\frac{6}{12}$
2) The teacher asks the pupils what is the relation between the numerator and the denominator in each case.
3) The pupils discuss the above question.
4) The teacher summarizes the ideas and concludes that $\frac{\bigcirc}{\triangle}\times\frac{\diamond}{\star}=\frac{\bigcirc\times\diamond}{\triangle\times\star}$.

Questioning Skills for Conclusion

To conclude the way of calculating the multiplication of two given fractions, after writing symbols $\frac{\bigcirc}{\triangle}\times\frac{\diamond}{\star}=$ on the blackboard, the teacher asks:

Example

T) "What is the symbol on the top of the fraction on the right hand side?

In other words,
T) "How do you calculate the number on the top of the fraction on the right hand side? "
T) "How do you calculate the number below the line?"

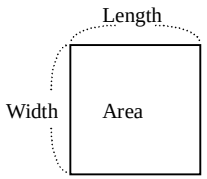
4. The Use of Chalkboard

A sample layout of chalkboard writing is shown below.

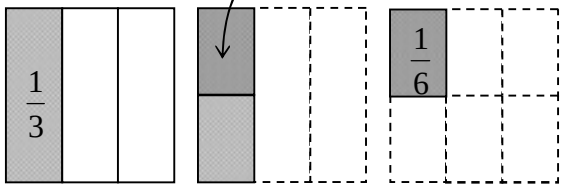
3/Oct/06 Multiplication of fractions

Mr. Adamu had a plot of land in a square shape of 1 km. Fati's father bought $\frac{1}{3}$ of the land and gave $\frac{1}{2}$ of it to Fati. We want to find out the fraction of the plot Fati got.

(Area) = (Length) × (Width)



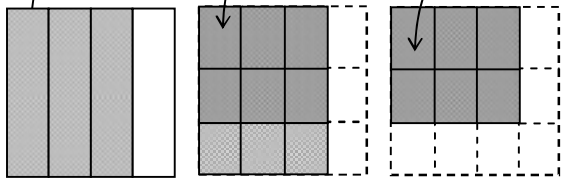
$\frac{1}{2}$ of $\frac{1}{3}$



$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

Mr. Adamu had a plot of land in a square shape of 1 km. Fati's father bought $\frac{3}{4}$ of the land and gave $\frac{2}{3}$ of it to Fati. We want to find out the fraction of the plot Fati got.

$\frac{3}{4}$ $\frac{2}{3}$ of $\frac{3}{4}$ $\frac{6}{12}$



$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$

Conclusion

$\frac{1}{2} \times \frac{1}{3} = \frac{1}{2 \times 3}$

$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4}$

Conclusion/ today's summary

$\frac{\bigcirc}{\triangle} \times \frac{\diamond}{\star} = \frac{\bigcirc \times \diamond}{\triangle \times \star}$

5. English as a Teaching Tool

In Class 4 the pupils will have been introduced to the following FRACTION WORDS and SYMBOLS:

Table 2: Fraction words and symbols

Numerator	Whole	bigger than: >	ascending order	largest
denominator	Part	less than: <	descending order	smallest
		Equivalent		

fourths eighths	Thirds sixths twelfths	Fifths tenths hundredths	half	quarter
(in the topic Fractions I and Fractions II)			(in the topic Measuring Time)	

They will also need to read the written numeral "ninths" in the pupils' book.

Simple definitions are given in the pupils' book. The teacher should ensure that the pupils learn and understand the written definitions. To help the pupils the teacher can display a wall chart showing the key words and their definitions as given in the pupil's book:

In Class 5 the pupils use the same FRACTION WORDS as they used in Class 4 and they revise the concepts covered in Class 4.

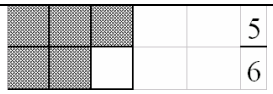
In Class 6 the section on fractions uses the following terms which will have to be reviewed with the pupils.

Table 3: List of the terms which will have to be reviewed with pupils

HCF	Abbreviation for Highest Common Factor
Halves	Irregular spelling
Product	Word Problems eg. find the product of $\frac{3}{5}$ and $\frac{10}{12}$
One quarter is the same as one fourth	Equivalent terms

The teacher should remind the pupils of the following definitions by displaying a chart on the classroom wall for ready reference:

Table 4: List of the definitions related to Fraction

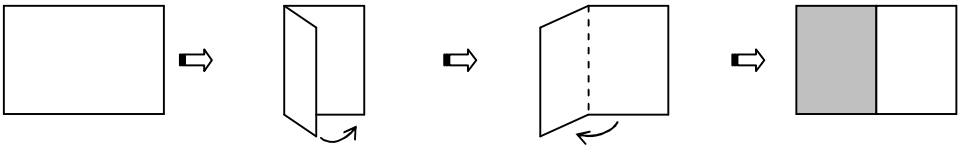
MATHEMATICS DEFINITIONS – FRACTIONS		
A fraction is a part of a whole	E.g.  $\frac{5}{6}$	
The numerator is the number at the top of the fraction The denominator is the number below the line	E.g. the numerator is 5 and the denominator is 6	$\frac{5}{6}$
"of" means "x"	$\frac{5}{6}$ of 12 = 10 $\frac{5}{6}$ × 12 = 10	
HCF means Highest Common Factor	The HCF of 12 and 3 is 3 12 = 3 × 4 3 = 1 × 3	So: $\frac{1\times 3}{3\times 4} = \frac{3}{12}$

Appendix (Additional activity)

Activity 1

For a model of $\frac{1}{2}$, fold and shade a rectangular sheet of paper.

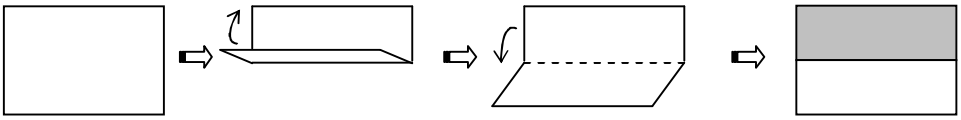
(a)



Step 1 Fold in half vertically

Step 2 Shade one part

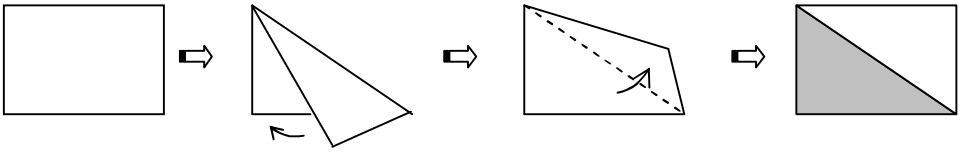
(b)



Step 1 Fold in half horizontally

Step 2 Shade one part

(c)

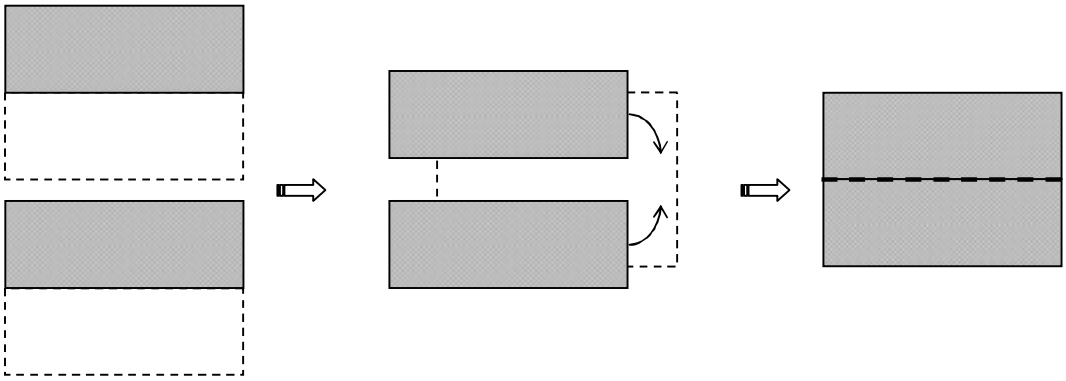


Step 1 Fold in half diagonally

Step 2 Shade one part

Activity 2

(1) Calculate $2 \times \frac{1}{2}$.



Step 1

Shade $\frac{1}{2}$ of each of two sheets of papers.

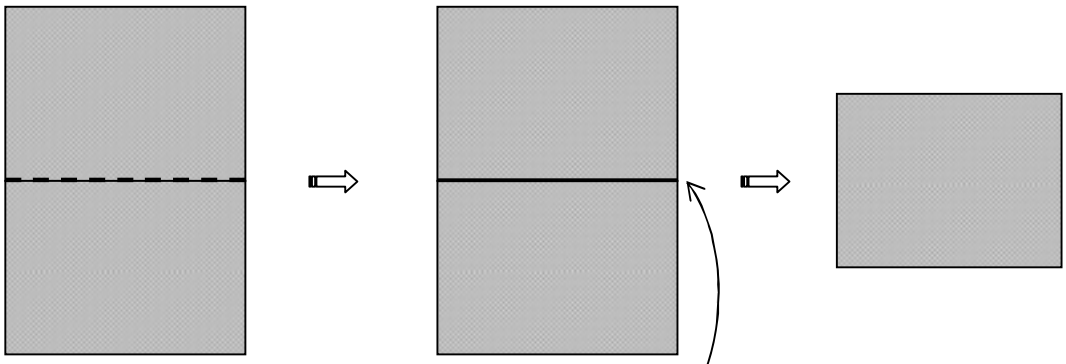
Step 2

Put the two shaded part together.

Step 3

Two halves is 1.

(2) Calculate $\frac{1}{2} \times 2$.



Step 1

Shade two sheets of paper and put them together to represent 2.

Step 2

Divide it into two equal parts.

Step 3

One shaded part represents 1.

Lesson 2: Primary 4: Measurement of Area

1. Lesson Overview

Introduction

When a farmer wants to farm, he/she takes many things into consideration, particularly, land available to him/her. The building contractor also considers the building plot at his/her disposal. Similarly, in the home, parents also consider the size of their rooms when they are laying beds for their children to sleep on. In our educational institutions, when admitting students into a class, we consider the amount of space in the classroom. When we talk about amount of surface an object possesses, then the concept of area is established.

Area therefore is the amount of surface an object has. It is measured in square units.

General Objectives of the Topic (Measurement of Length and Area in Primary 4)

The pupil will be able to

- measure lengths of line segments in centimetres.
- estimate and verify the lengths of given line segments.
- add measures of lengths in metres and centimetres.
- find the perimeter of given rectangular and circular shapes.
- write lengths given in metres and centimetres using decimal notation.

Specific Objectives of the Lesson (Area of a Square or Rectangular region)

By the end of the lesson, pupils will be able to

- make squares and rectangles using small square tiles (cut-outs).
- find the number of unit squares that will cover a square/rectangular region.

Table 5: Class and Unit that this topic can be found

Class	Unit
Primary 1	Unit 1.12:Measurement of Length, Capacity and Mass
Primary 2	Unit 2.5: Measurement of Length, Capacity and Mass
Primary 3	Unit 3.6: Measurement of Capacity and Weight
Primary 4	**Unit 4.10: Measurement of Length and Area** **4.10.7 Find the number of unit squares that will cover a square/rectangular region(←The lesson plan is for this unit!)** Unit 4.14: Measurement of Capacity and Volume
Primary 5	Unit 5.5: Measurement of Length, Mass and Capacity Unit 5.9: Area and Volume
Primary 6	Unit 6.6: Measurement of Length, Capacity and Mass Unit 6.12: Measurement of Area and Volume

Relevant Previous Knowledge (R.P.K)

(Topics covered in various classes)

Primary 1

- comparing the lengths and heights of various objects that cannot be put side by side.

Primary 2

- measuring and stating the lengths of given distance/heights in metres,
- estimating the lengths of given distances/heights in metres.

Primary 3

- estimating the capacity of containers in litres,
- identifying objects which are heavier or lighter than 1 kilogram,
- estimating the weight of object in kilograms.

Primary 4

- finding lengths of given segments in centimetres,
- estimating the lengths of line segments,
- finding the total lengths of two or more given measures,
- finding the perimeters of given rectangular and circular shapes,
- writing given lengths in decimal notation.

However, the teacher should not assume that all pupils in the class have a good understanding of the above. It is always important to pay attention to the individual needs of pupils

Details About the Class: (This is an Example)

(Refer to Module 4: 4.1.3. "Details about the Class" **for further explanation.)**

The class consists of 25 pupils (11 are boys and 14 are girls). In a previous investigation, 5 pupils answered that they like mathematics, 5 answered in the negative. A readiness test indicated that 18 pupils could give the meaning of length. They could find the total lengths of two given measures. Among the rest of the pupils, 4 could not measure the lengths of given segments in centimetres. Almost half of the pupils are likely to think that if the perimeter of a rectangle is greater, then the area is greater.

Half of the pupils can appreciate the value of Mathematics and have a positive attitude towards its study.

2. Lesson Plan

MEASUREMENT OF AREA

SUBJECT: Mathematics **REFERENCES:** Ghana Mathematic Series, Pupil's Book Four (Ghana Publishing Corporation)
CLASS: Primary 4 **DETAILS ABOUT THE CLASS:** 10 pupils (40%) can understand the lengths well, but 3 pupils(12 %) cannot.

DATE/ DAY/TIME/ DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE REMARKS
Oct.4 2006 Wednesday 9:00am - 10:00am 60 minutes	UNIT 4.10 TOPIC: Measurement of Length and Area SUB-TOPIC: Calculating Area	OBJECTIVE(S) By the end of the lesson, the pupil will be able to; 1. make rectangles and squares using small square tiles (cut-outs). 2. find the number of unit squares that will cover a square/rectangular region. R.P.K. Measuring Area pp.105-107	TLMs: Cut-outs or Small squares, Sheets Keywords/Vocabulary List: Length, width, area, long, wide INTRODUCTION (10 min): Teacher introduces the lesson by telling a story relating to area (e.g.. land, plantation, etc.) Story: A farmer walked around his 2 plantations whose shapes are rectangular and said, "I have found the perimeters of my 2 plantations to be the same, so I will harvest the same amount of maize from each of them" ACTIVITIES: Step 1 (5 min) Pupils make 5 or 6 groups. Teacher gives a sheet on which 4 rectangles have been printed with A, B, C, D, and smaller square cut-outs of 1cm by 1cm to each group.	Core Point 1 Teacher prepares 4 or 5 sheets and plenty of cut-outs.	Remarks: Pupils are not supposed to be introduced the unit "cm²" until P5 where they learn area with the unit "cm²"

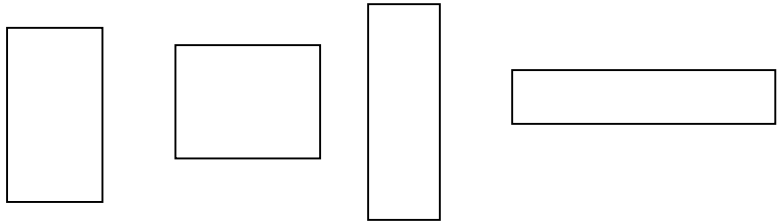
			A: 6cm×3cm B: 4cm×5cm C: 7cm×2cm D: 2cm×8cm  Step 2 (15 min) Pupils cover the rectangles with the smaller square cut-outs of 1cm by 1cm. Step 3 (15 min) Pupils complete the table on the chalkboard: Pupils find the relationship between the total number of squares and the numbers of squares on the sides of the rectangle. CONCLUSION (15 min): The teacher introduces the concept of area by summarizing the pupils' findings and explains the conclusion.	Core Point 2 Pupils activity (Pupils try to cover the rectangles without holes and count the squares) Core Point 3 Total No.of squares = No. of squares on the longer side × No. of squares on the shorter side Core Point 4 (Area) =(Length)× (Width)	Find the number of cut-outs that fill a given region. Indicate number of unit squares that will cover a given rectangular region. Find the relationship in the figure

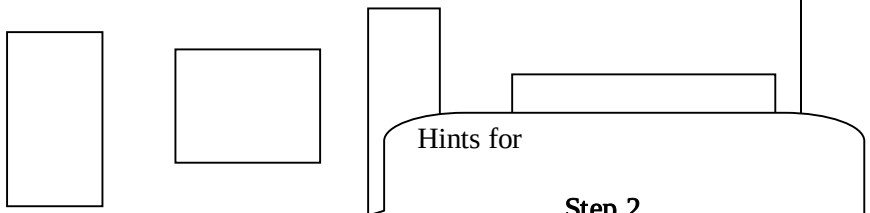
Figure	Total no. of squares	No. of squares on the longer side	No. of squares on the shorter side
A			
B			
C			
D			

Lesson Plan with Hints

The lesson plan below shows speech blobs (rounded rectangular shapes) that indicate hints for the teaching approach. The hints for the teaching approach deal with specific skills in the lesson delivery and they are explained in detail on the following pages. The position of each balloon indicates where each of the hints can be used

DATE/ DAY/TIME/ DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE REMARKS
Oct.4 2006 Wednesday 9:00am - 10:00am 60 minutes	UNIT 4.10 TOPIC: Measurement of Length and Area SUB-TOPIC: Calculating Area	OBJECTIVE(S) By the end of the lesson, the pupil will be able to; 1. make rectangles and squares using small square tiles (cut-outs). 2. find the number of unit squares that will cover a square/rectangular region. R.P.K. Measuring Area pp.105-107	TLMs: Cut-outs or Small squares, Sh Keywords/Vocabulary Lis Length, width, area, long, Hints for **Introduction** INTRODUCTION (10 min): Teacher introduces the lesson by telling a story relating to area (e.g.. land, plantation, etc.) Story: A farmer walked around his 2 plantations whose shapes are rectangular and said, "I have found the perimeters of my 2 plantations to be the same, so I will harvest the same amount of maize from each of them" Hints for **Step 1** ACTIVITIES: Step 1 (5 min) Pupils make 5 or 6 groups. Teacher gives a sheet on which 4 rectangles have been printed with A, B, C, D, and smaller square cut-outs of 1cm by 1cm to each group.	Core Point 1 Teacher prepares 4 or 5 sheets and plenty of cut-outs.	Remarks: Pupils are not supposed to be introduced the unit "cm²" until P5 where they learn area with the unit "cm²"

A: 6cm × 3cm B: 4cm × 5cm C: 7cm × 2cm D: 2cm × 8cm



Hints for

Step 2

Step 2 (15 min)
Pupils cover the rectangles with the smaller square cut-outs of 1cm by 1cm.

Core Point 2
Pupils activity
(Pupils try to cover the rectangles without holes and count the squares)

Find the number of cut-outs that fill a given region.

Hints for

Step 3

Step 3 (15 min)
Pupils complete the table on the chalkboard:

Figure	Total no. of squares	No. of squares on the longer side	No. of squares on the shorter side
A			
B			
C			
D			

Core Point 3
Total No.of squares
= No. of squares on the longer side × No. of squares on the shorter side

Indicate number of unit squares that will cover a given rectangular region.

Hints for

Conclusion

Pupils find the relationship between the total number of squares and the numbers of squares on the sides of the rectangle.

CONCLUSION (15 min):
The teacher introduces the concept of area by summarizing the pupils' findings and explains the conclusion.

Core Point 4
(Area)
=(Length)× (Width)

Find the relationship in the figure

3. Teaching Hints

Hints for Introduction

Introductory Questioning of Skills

By way of introduction, the teacher can ask questions that will check the pupil's R.P.K. based on the following story:

Story (1) A farmer walked around his 2 plantations whose shapes are rectangular and said, "I have found the perimeters of my 2 plantations to be the same, so I will harvest the same amount of maize from each of them"

Or

Story (2) A farmer walked around his 2 plantations whose shapes are rectangular and said "I have measured the perimeters of my 2 plantations and found that the perimeter of the plantation located in the east is greater than the one in the west, so I will harvest the larger amount from the plantation in the east."

Example

T) "Given a rectangle, how do you measure the perimeter?"
T) "Given 2 rectangles, if one has a longer perimeter does it necessarily make the area bigger? "
T) "Is the farmer's idea correct?"

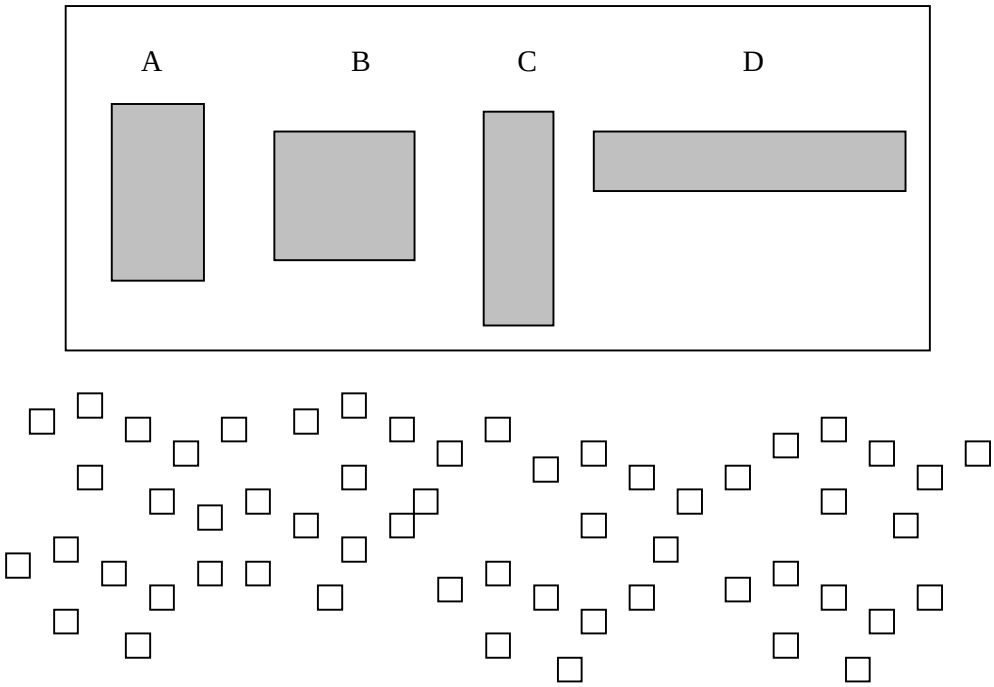
After hearing the pupils' responses, the teacher states that the correct answers will become clear in the lesson.

Hints for Step 1:

For each group, the teacher prepares 4 or 5 sheets of paper on which 4 rectangles are drawn and labelled A, B, C, D; the teacher also prepares smaller square cut-outs of 1cm by 1cm in advance. The pupils are then organized into groups of 5 or 6.

Approach to Step 1

The teacher prepares 4 or 5 sheets of paper and many square cut-outs of 1cm by 1cm as follows:



Hints for Step 2:

Let the pupils cover the rectangles with the square cut-outs of 1cm by 1cm without leaving any spaces or holes.

Approach to Step 2

It is valuable for each group to cover all the rectangles, however this is likely to take a long time. The teacher should be flexible. For example, if the class consists of 24 pupils organized into 4 groups, then the teacher lets one group cover the rectangles A & B while other groups concentrate on different rectangles, etc.

After covering the rectangles, let the pupils count the number of squares and write the result on the sheet.

While the pupils work, the teacher draws the following table on the chalkboard.

Table 6: Table for the investigation of the area of rectangles

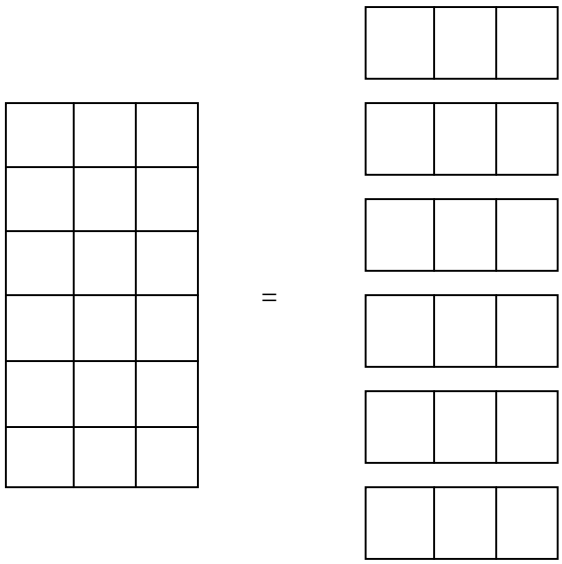
Figure	Total No. of squares	No. of squares on the longer side	No. of squares on the shorter side
A			
B			
C			
D			

Hints for Step 3:

1. Let the groups complete the above table.
2. Let the pupils find the relation between the total number of squares and the number of squares on the sides of the rectangle.

Approach to Step 3

1. Use Table 2 to fill in the numbers.
2. Let the pupils see the relationship between length, width and area.
3. The teacher draws a diagram if necessary, as follows:



Questioning Skills for Step 3

1) After the group activity, the teacher asks each group to fill out Table2 on the chalkboard:

Note: This is the first time the words "wide" and "width" are used in the pupils' book. (See English as a Teaching Tool)

Example

T) How many small squares cover shape A?
T) How many small squares wide is rectangle A?
(or How many small squares are there on the shorter side ?)
T) How many small squares long is rectangle A?
(or How many small squares are there on the longer side?)

2) Using Table 2, the teacher asks the pupils:

Example

T) Is there any relationship between the 3 numbers, 18, 6 and 3?

(20, 4 and 5, etc.)

T) Can you tell the relationship the 3 numbers in every rectangle has?

3) If the pupils find the relation, the teacher asks for the reason. If not, then the teacher explains Figure 3 and asks for the reason.

Example

T) Can you explain the reason why you choose multiplication to get the total number of small squares?

If the answer is yes,

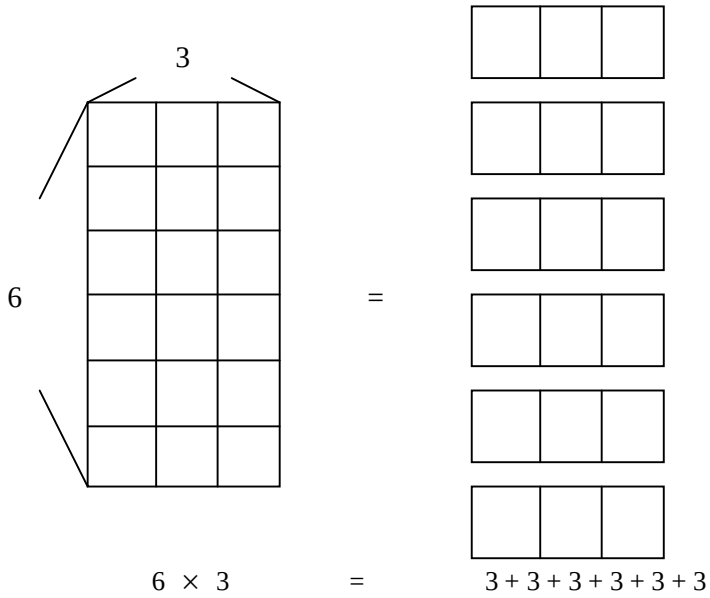
T) Could you try to explain it?

Hints for Conclusion:

The teacher, in summarizing the pupils' findings, introduces the concepts of length, width and area.

Approach to Conclusion

1) Using Figure 3, the teacher explains 18 = 6 × 3, that is,



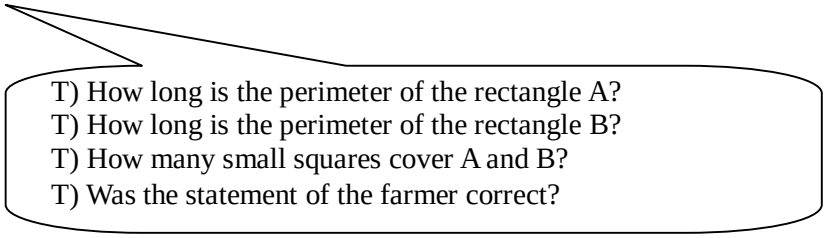
2) The teacher confirms with the pupils that:

Total No. of squares=No. of squares on the longer side× No. of squares on the shorter side.

3) The teacher introduces the new mathematical terms and concludes the lesson by stating the formula: AREA of a rectangle = LENGTH × WIDTH

Questioning Skills for Conclusion

The teacher asks for the perimeters of the rectangle A and B (resp.B and D) , and then asks for the answer to the initial **story.(1)** (resp. **story(2)**).



4. The Use of Chalkboard

A sample layout of chalkboard writing is shown below.

3/Oct/06 MEASUREMENT OF AREA

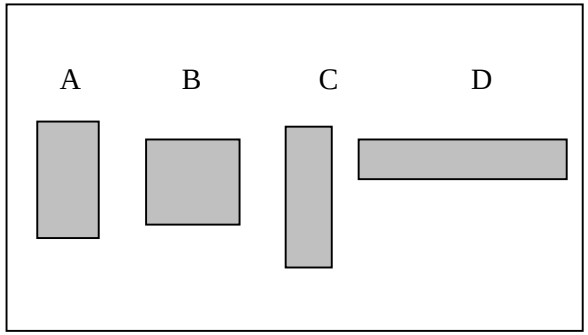
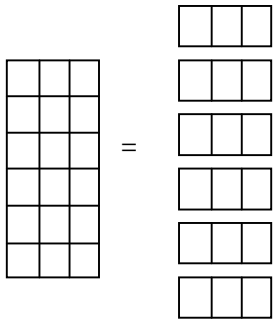


Figure	Total no. of squares	No. of squares on the longer side	No. of squares on the shorter side
A			
B			
C			
D			

A)



$18 = 6 \times 3$

B) $20 = 5 \times 4$ C) $14 = 7 \times 2$ D) $16 = 8 \times 2$

Total No.of squares = No. of squares on the longer side × No. of squares on the shorter side

Conclusion

(Area) = (Length) × (Width)

5. English as a Teaching Tool

The pupils will have learned that area can be measured by counting the total number of squares that cover a regular shape (square or rectangle). In this lesson they learn, through deduction, how to calculate area by counting the number of squares in the length and width of the shape and multiplying the two numbers.

This is the first time the words "wide" and "width" are used in the pupils' book. The teacher should introduce these words carefully. The pupils need to understand and know how to use the words:

Table 7: The meanings of Length and Width

NEW VOCABULARY		PRACTICE SENTENCES	DEFINITION
length	long	Measure the length How long is it?"	The area of a rectangle equals length multiplied by width area = length x width
width	wide	Measure the width. How wide is it?	

This is a good opportunity for the pupils to understand by practising some simple phrases in English. They can practise these sentences in oral and written form. For example:

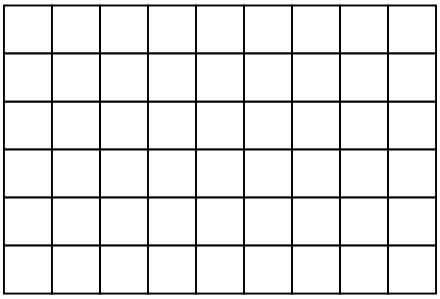
Table 8: List of the sentences in oral and written form

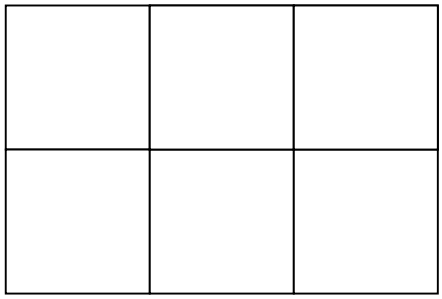
QUESTION / INSTRUCTION	ANSWER
Measure the length of rectangle A. How many small squares long is rectangle A?	Rectangle A is ….. small squares long.
Measure the width of rectangle A. How many small squares wide is rectangle A?	Rectangle A is ….. small squares wide.
How many small squares cover the shape? What is the area of the shape?	….. small squares cover the shape. The area of the shape is ….. small squares.
Multiply the length by the width.	

Appendix (Finding the Area of a rectangle)

Activity 1

In groups, ask pupils to fit a rectangle with pieces of two types of squares, and to find the number of each type of squares in the rectangle.





One can come to realize the difference in the number of each type of squares, even though the same rectangle is used.

What brings out these differences?

This activity tells us the need to use standardized small square unit in measuring area.

Activity 2

Draw all possible rectangles with area 12cm² in Figure 1.

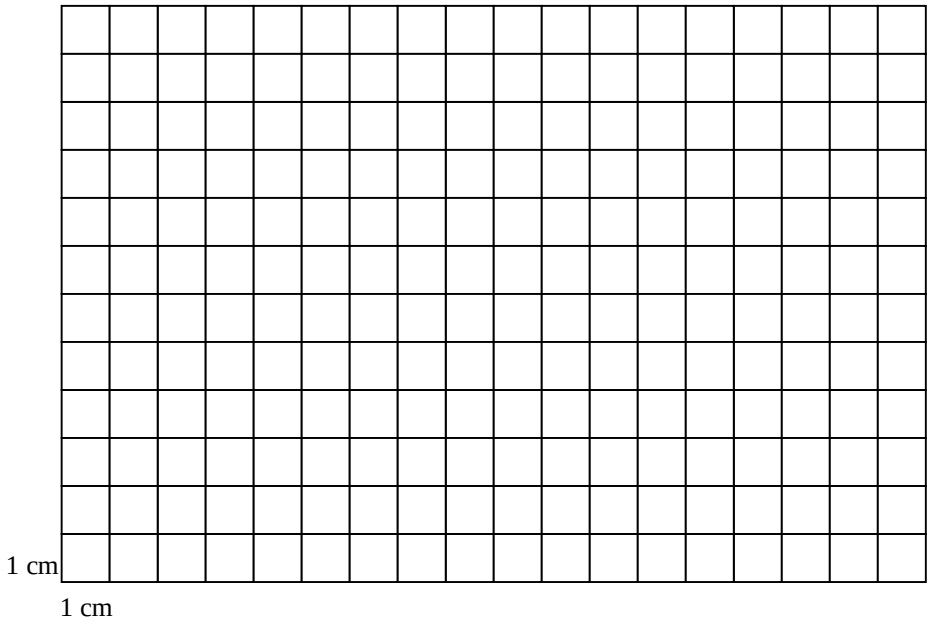


Figure 1

Activity 3

Draw different rectangles on a square grid of paper.

One can establish the relationship between the dimensions of squares and rectangular shapes and the total number of smaller squares they contain. See the example in Figure 2.

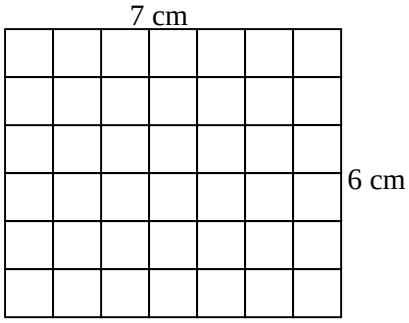


Figure 2

1. What is the total number of squares occupied by the rectangle? (42)
2. What are the length and the width of the rectangle in Figure 2? (7cm and 6cm)
3. Can a relationship been established between the total number of squares and the dimensions of the rectangle?

Activity 4

Find the area of the shaded portion in Figure 3.

Think about different approaches in (1), (2), (3) and (4).

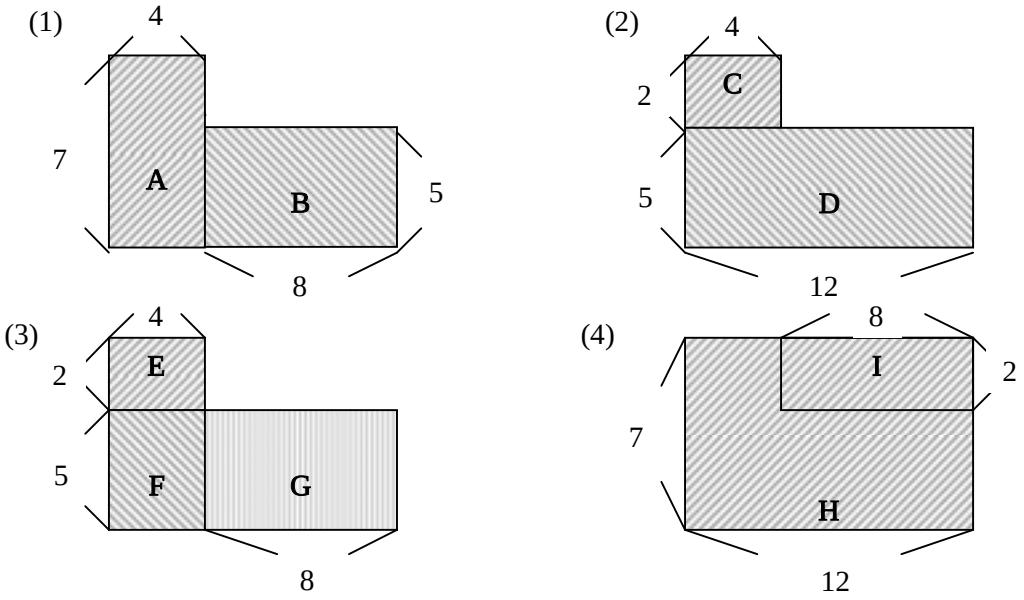


Figure 3

(1) $7\times4+8\times5$

(2) $4\times2+12\times5$

(3) $4\times2+5\times4+8\times5$

(4) $12\times7-8\times2$

Sample Lesson Plans (TYPE B)

Lesson 3: Investigation with Numbers – Triangular Numbers (Primary 5)

1. Lesson plan

2. English as a teaching tool

Lesson 4: Shape and Space-Angles (Primary 5)

1. Lesson plan

2. English as a teaching tool

Lesson 5: Collecting and Handling Data (Primary 5)

1. Lesson plan

2. English as a teaching tool

Lesson 3: Primary 5 Investigation with Numbers – Triangular Numbers

1. Lesson Plan

SUBJECT: Mathematics **REFERENCES**: Primary Mathematics 5(Unimax Macmillan)
CLASS: Primary 5 **Details about the Class**: 24pupils (60%) can add the integers correctly, but 4 pupils (10%) cannot

DATE/ DAY/TIME/DURATION	TOPIC/SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE REMARKS
3 Oct. 2006 Tuesday 10:00am - 10:30am 30 minutes	UNIT 5.15 TOPIC: Investigation with number SUB-TOPIC: Triangular numbers	OBJECTIVE(S): By the end of the lesson, the pupil will be able to; 1. find the pattern in triangular numbers up to the 10^{th} number R.P.K. Pupils can add and subtract whole numbers.	TLMs: Bottle tops (to form figures) Keywords/Vocabulary List: Triangular number, Addition INTRODUCTION: Teacher introduces triangular numbers. ACTIVITIES: Step 1 Pupils form the triangular numbers of the pattern No.1-3 using bottle tops. Step 2 Teacher asks pupils to find the total number of the bottle tops of the pattern No.1-3. Step 3 Teacher asks pupils to predict the number of the bottle tops of the patterns No.4, 5 and 6 without using bottle tops.	Pattern No. 1 1 1 Pattern No. 2 1 2 3 Pattern No. 3 1 2 3 6	1. Write the next terms in pattern of triangular numbers

<table>
<tr>
<td></td>
<td></td>
<td></td>
<td>Step 4
Pupils investigate the pattern of triangular numbers using bottle tops.

Step 5
Pupils write their findings in the following table:
<table>
<tr><th>Pattern No.</th><th>Total</th><th>Pattern</th></tr>
<tr><td>1</td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td></tr>
<tr><td>3</td><td></td><td></td></tr>
<tr><td>4</td><td></td><td></td></tr>
<tr><td>5</td><td></td><td></td></tr>
<tr><td>6</td><td></td><td></td></tr>
<tr><td>7</td><td></td><td></td></tr>
<tr><td>8</td><td></td><td></td></tr>
<tr><td>9</td><td></td><td></td></tr>
<tr><td>10</td><td></td><td></td></tr>
</table>
Step 6
Pupils present their own finding to other pupils in the classroom.

CONCLUSION:
Pupils describe the pattern of triangular numbers.</td>
<td>
<table>
<tr><th>Pattern</th></tr>
<tr><td>1</td></tr>
<tr><td>1+2</td></tr>
<tr><td>1+2+3</td></tr>
<tr><td>1+2+3+4</td></tr>
<tr><td>1+2+3+4+5</td></tr>
</table>
Pattern:
1+2+3+4+5+6+…
</td>
<td></td>
</tr>
</table>

2. English as a Teaching Tool

In this lesson the pupils investigate patterns in triangular numbers by building up the sequence of numbers and then looking at their results.

The teacher will need to think carefully about what he/she will expect from the pupils in Step 6 of the lesson when pupils present their own findings to others and in the concluding part of the lesson when pupils describe the pattern of triangular numbers. It is in these two parts of the lesson that the pupils will need to be able to express their ideas orally through English language. Here are some ways in which teachers' English as a teaching tool help develop the pupils' use of language.

Table 9: Ways of developing the pupils' use of language

Use simple language:	"What pattern can you see in the numbers?" "Look at this pattern. What is the next number?" "What is the previous number?" "How do the numbers change?" "What happens next?"
Help the children to answer in full sentences:	"The next number is 10" "The previous number is 6" "We add one more number each time."
What answers do you expect from the pupils?	"Is there only one or more than one answer?" "In this investigation there is more than one answer - see the Solution below."
Lesson Conclusion	"One way to show the solutions is in written format which the children can read for oral practice."

Solution **Unit 15. Investigation with Numbers: Triangular Numbers**

Description of the Patterns of Numbers

(i) In the first column the numbers increase by one.

We add 1 to get the next number in the pattern.

1+1=2, 2+1=3, 3+1=4, 4+1=5

(ii) In the second column the number increases by the number written in the first column.

For pattern number 4 we add 4 to the previous number. 6 + 4 = 10

For pattern number 5 we add 5 to the previous number 10 + 5 = 15

For pattern number 6 we add 6 to the previous number 15 + 6 = 21

(iii) In the third column we add all the numbers from 1 to the pattern number.

For pattern number 4 we add 1+2+3+4 = 10
For pattern number 5 we add 1+2+3+4+5 = 15
For pattern number 6 we add 1+2+3+4+5+6 = 21

We can also show the solutions diagrammatically. Some pupils may prefer this and it can help them to describe the patterns orally.

Solution **Unit 15. Investigation with Numbers: Triangular Numbers**

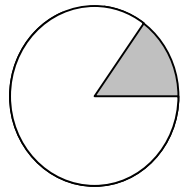
Description of the Patterns of Numbers

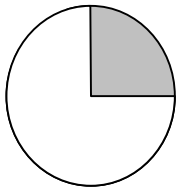
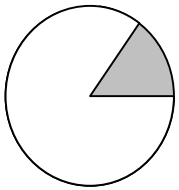
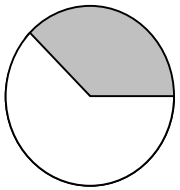
1 →	1 = 1	1	= 1
2 →	2 + 1 = 3	1 + 2	= (1) + 2
3 →	3 + 3 = 6	1 + 2 + 3	= (1 + 2) + 3
4 →	4 + 6 = 10	1 + 2 + 3 + 4	= (1 + 2 + 3) + 4
5 →	5 + 10 = 15	1 + 2 + 3 + 4 + 5	= (1 + 2 + 3 + 4) + 5
6 →	6 + 15 = 21	1 + 2 + 3 + 4 + 5 + 6	= (1 + 2 + 3 + 4 + 5) + 6

Lesson 4: Primary 5 Shape and Space-Angles

1. Lesson Plan

SUBJECT: Mathematics **REFERENCES**: Primary Mathematics 5(Unimax Macmillan)
CLASS: Primary 5 **DETAILS ABOUT THE CLASS**: 24pupils (80%) can understand the meaning of right angles, but 3 pupils (10%) cannot.

DATE/ DAY/TIME/DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE REMARKS
3 Oct. 2006 Tuesday 10:00am - 11:00am 60 minutes	UNIT 5.6 TOPIC: Shape and Space SUB-TOPIC: Right angles	OBJECTIVE(S) By the end of the lesson, the pupil will be able to; state if an angle is greater or less than a right angle. R.P.K. Pupils have been introduced to concept of angles	TLMs Interlocking Circles for Teacher Interlocking Circles for Pupils (Individually) Keywords/Vocabulary List: Right angle INTRODUCTION Teacher introduces the lesson by asking pupils about soldiers at a parade, drilling exercise: left turn, right turn etc. When the soldiers turn, their arrangement forms angles. ACTIVITIES: Step 1 Teacher forms an angle from the interlocking circles. Step 2 Pupils describe the angle formed before the teacher mentions the name of the angle.	 The shaded part represents an angle less than 90º.	1. Pupils are given the desktop type of interlocking circles and teacher uses the blackboard type to form various angles.

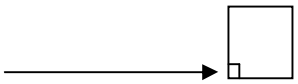
			Step 3 Pupils form the same angle with their interlocking circles. Step 4 Teacher asks pupils to look around the classroom to see if the angle formed can be found anywhere. Step 5 Teacher forms another angle and asks pupils to mention its name and describe it. Step 6 Pupils also form the same angle with their interlocking circles. Step 7 Pupils form two more angles, mention their names and describe them. A  B  C  CONCLUSION: Teacher discusses with pupils the importance of angles to our daily life. - We turn through an angle to talk to partners - We open doors to have passage - Architects use angles in their work. Etc.	In diagram A, the shaded circle indicates a “Right angle”. In diagram B, “Less than a right angle”, and in diagram C, “More than a right angle”.	

2. English as a Teaching Tool

The pupils learn about right angles in Grade 4 and Grade 5. Here are some simple definitions for angles which the children can write in their exercise book with an illustration. They can use this as a reference for revision and to practise their English:

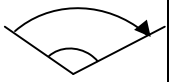
Definitions of Angles

1) The angle at each corner of a book is **a right angle**.
We mark right angles like this.

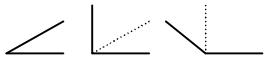


2) The space between **two straight lines** that meet is called **an angle**.

3) An angle is formed when a **straight line turns** about a point.



4) The more the line turns, the greater the angle formed.



NOTE: In Grade 5, pupils study right angles, angles that are less than a right angle and angles that are more than a right angle. They do not use the words “acute angle” and “obtuse angle” until the secondary school grades.

Appendix (Interlocking Circles)

Teaching and learning materials (TLMs) are very important in the teaching/learning processes. They make teaching understandable, practical and interesting to the learner.

Today, we are to prepare "Interlocking Circles" which will help us to teach topics such as Angles, Parts of a circle, Fractions (Decimals and Percentages), and Bearing etc.

Interlocking circles are two equally cut out circles painted/shaded differently. They are both tilted at the centre and locked together. One of them is then kept fixed, whiles the other is made to be turning round.

The circles could be made from paper, cardboard, plywood and flat metals. (eg. Zinc)

INTERLOCKNG CIRCLES USING MANILA CARD / CARDBOARD

(1) Chalkboard Size

Materials needed:

- Pencils and chalk
- Pairs of compasses (Chalkboard and Mathematical set size)
- 25cm and 1m rulers
- Cardboards, Manila Cards, Empty Cartons
- Pairs of scissors / Blade (Cutting materials)

Procedure

Step 1: Draw a circle of radius 25 centimetres on each of the two cardboards
Step 2: Use the pair of scissors to cut the radii (25cm) of the circles drawn.
Step 3: Make a slit on the circles, the length should be the same as the radius of the circle.
Step 4: Tilt the two circles at the centre and lock together. One of the circles should be fixed and the other circle made to be turning round

Preparation of interlocking circles

Teacher stands in front of the blackboard, with cardboard on the table.

Step 1: Measure 25cm using the pair of compasses.
Step 2: Locate the centre of the circle on the cardboard to avoid waste.
Step 3: Draw two circles each of radius 25cm on different colour cardboards as shown in Figure 4 and 5.

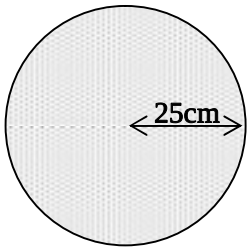


Figure 4

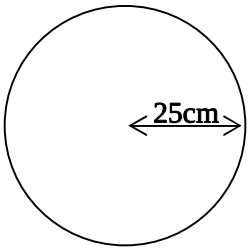


Figure 5

Step 4: Cut along the radii of the circles as shown in Figure 6 and 7.

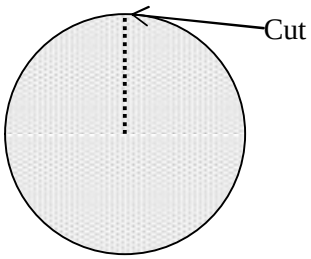


Figure 6

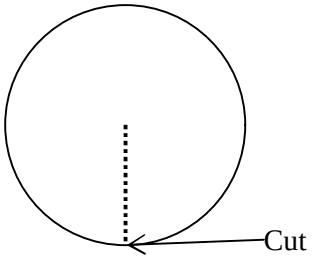


Figure 7

Step 5: Put the scales 0°, 180°, 270° and 360° on the one of the circle as shown in Figure 9.

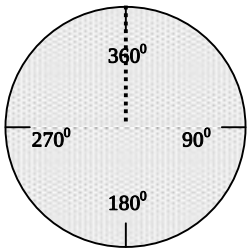


Figure 8

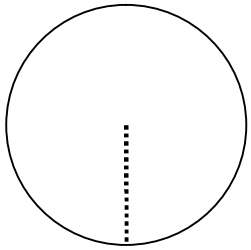


Figure 9

Step 6: Interlock the two circles as shown in Figure 10.

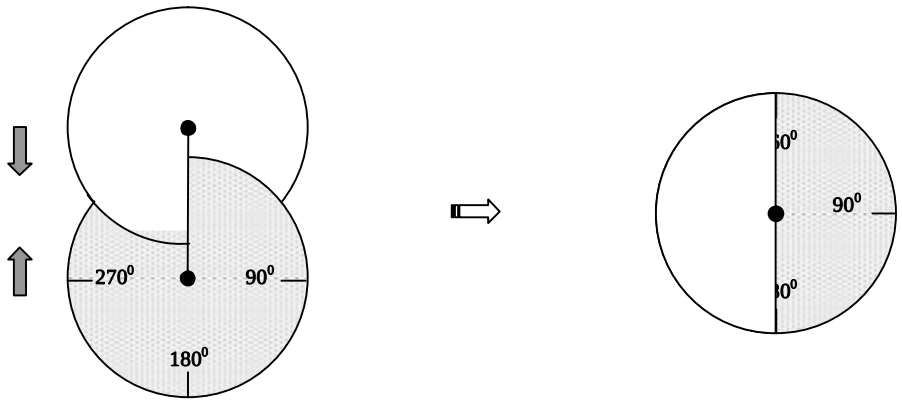


Figure 10

(2) Desktop Size for pupils and students

The interlocking circles for pupils can be prepared like the one for teacher, changing the radius of the circle into around 7cm and more.

(3) Topics that can be taught using Interlocking Circles:

- Types of angles (acute, obtuse, reflex, right angle etc.)
- Parts of circles
- Fractions (Decimals and percentages)
- Bearings

Lesson 5: Primary 5 Collecting and Handling Data

1. Lesson Plan

SUBJECT: Mathematics **REFERENCES**: Primary Mathematics 5(Unimax Macmillan)
CLASS: Primary 5 **DETAILS ABOUT THE CLASS**: 32pupils (80%) can count objects up to 500, but 4 pupils (10%) cannot.

DATE/ DAY/TIME/DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE(S) R.P.K.	TEACHING/LEARNING MATERIALS KEYWORDS/VOCABULARY LIST TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE REMARKS
3 Oct. 2006 Tuesday 10:00am -11:00am 60 minutes	UNIT 5.2 TOPIC Collecting and Handling Data SUB-TOPIC Constructing a pictograph	OBJECTIVE(S) By the end of the lesson, the pupil will be able to; 1. collect and sort data into shapes. 2. answer at least two questions correctly on the pictograph. 3. draw a frequency table. R.P.K. Pupils can count objects up to 500.	TLMs Empty milk tins, bottle tops, matchboxes Keywords/Vocabulary List: Pictograph INTRODUCTION: Ask a pupil to count all tables in the classroom, another to count the reading books, and record their findings. ACTIVITIES: Step 1 In pairs, pupils collect discrete objects, sort them into shapes and count them into groups. Step 2 Pupils record groups of numbers and compare them according to sizes . Step 3 Pupils present their arrangements of discrete objects to show a pictograph. E.g. Brands of	Objects of the same shapes are put in a group. Data collection including numerals. e.g. 11, 13, 24, etc. A pictograph is a type of graph In which simple motif (a	1. Copy and arrange the data below in ascending order. 13, 11, 13, 24, 7, 13, 24. 2. Draw a pictograph to show the favourite drink

<table>
<tr>
<td></td>
<td></td>
<td></td>
<td>matchboxes used in pupils homes

Step 4
Teacher asks pupils to study the practical arrangement of discrete objects and design a statistical table to represent a given data.
E.g. Favourite drinks of 20 pupils.

CONCLUSION:
Let pupils tell the class how data collection and recording was performed.
Pupils answer questions on their friends' favourite drinks in the frequency table.</td>
<td>symbol, picture or diagram) is used to represent a specific unit. A key is necessary to give the meaning of each motif on the pictograph.

E.g.
A Pictograph of brands of Matchboxes

Star boxes □□□

Rainbow boxes □□□□□

Pottery boxes □□

Key : □ represents a match box

A table for data collection of brands of Matchboxes
Frequency Table
<table>
<tr><th>Match boxes</th><th>Strokes</th><th>frequency</th></tr>
<tr><td>Starry</td><td>///</td><td>3</td></tr>
<tr><td>Rain-b ow</td><td>////</td><td>5</td></tr>
<tr><td>Pottery</td><td>//</td><td>2</td></tr>
</table></td>
<td>of 20 pupils
Fanta- 4
Coke- 8
Sprite- 6
Pepsi- 2

3. From the pictograph Which drink did pupils like most?

4. From the pictograph, which of the drinks was not liked by pupils?

5. Draw a frequency table on the favourite drink of 20 pupils.
Fanta- 4
Coke- 8
Sprite- 6
Pepsi- 2

6. Write down the number which shows the highest frequency</td>
</tr>
</table>

2. English as a Teaching Tool

In Class 5 the pupils will have learned to analyze information from frequency tables, block graphs and bar graphs. In Class 6 the pupils have to conduct their own survey and complete each stage of the survey including collecting and handling the data.

The teacher can introduce simple phrases for the pupils to use at each stage of the process. This provides a good opportunity to practice using English in real situations. For example, in conducting a survey of favourite drinks the teacher can introduce the following phrases for each stage:

Stage 1: Designing the Survey

The pupils can practice the following question and answer:

"What do you like to drink?" or "What is your favourite drink?"

"I like Fanta" or "My favourite drink is Fanta"

The teacher asks the pupils

"Make a list of the favourite drinks" or "Make a table of favourite drinks like this".

[on the chalkboard]

Frequency Table		
favourite drinks	tally / count	frequency
Fanta		
Sprite		
Coke		

frequency means the number of times something occurs

Ask the children to suggest the list of words to write on the frequency table.

Write the definition of frequency to help the children to understand the concept of a frequency table.

Stage 2: Conducting the Survey

The pupils can use the same questions as above, this time making a tally mark on the frequency table as each answer is given.

Stage 3: Drawing the Block Graph

The teacher will need to give the pupils clear step-by-step instructions in English for them to draw the block graph correctly.

Stage 4: Analysing the Data

In small groups the pupils should practice asking each other simple questions about the survey results. The teacher can give them some suggestions, for example:

"What is your favourite drink?" - the pupil should answer with a sentence: "My favourite drink is ……"

"How many pupils like coke best" – the pupil answers: "…… pupils like coke best"

Appendix

1. Collecting data

Data can be obtained from experiments, studies, surveys, records, observation and/or participation, interviews, as well as other areas of research. In the classroom situation it is the responsibility of the teacher to make data collection as practical as possible. Pupils can be made to carry out a simple survey to collect data by using some or all of the following:

1. Days of the week pupils were born
2. The number of different types of bottle tops
3. Heights of pupils in a class
4. Favourite food of pupils
5. Monthly births at a given hospital
6. Rainfall patterns throughout the year
7. Weekly attendance of pupils in a class
8. Marks scored by pupils in a Mathematics test

2. Organising data

One way of organising data is by constructing a frequency table. A frequency table is a table containing items in an observed data and their corresponding frequencies. It could be heights, weights, ages of pupils/students or marks scored by pupils/students in a class.

3. Representing data

Data can be represented by diagrams for easy interpretation. They are Pictographs, Line graphs, Block graphs, Bar graphs, Pie charts and others.

1) Pictograph

This is a pictorial representation of data which uses pictures, symbols and/or diagrams to represent a specific unit. Pictograph uses a key.

2) Block graph

A block graph is a chart using a simple square or rectangle block for a unit to represent the data. In drawing a block graph;

1. the blocks must be of the same width
2. the space between the adjacent blocks must be of the same width
3. a block graph does not have a vertical axis, but a horizontal axis which represents the items
4. it has a key

The data can be collated in a 3-dimensional block chart using concrete materials like matchboxes, Cuisenaire rods, Multi-base Blocks (cubes) etc.

3) Bar graph

A bar graph is a chart that uses bars of equal width to represent data. In drawing any of the bar graphs;

1. the widths of bars must be the same

2. the distance between any two adjacent bars must be equal
3. the length of each bar is proportional to the number of items in that column

Activity 1

The shoe sizes of pupils in class were measured by a pupil as follows;

35, 37, 37, 35, 36, 36, 36, 35, 38, 38, 38,
39, 38, 36, 36, 36, 40, 40, 37, 37, 37, 37,
37, 41, 42, 37, 37, 37, 37, 37, 38, 38, 38, 38.

Put this data on a frequency table

Shoe size	Tally	Number of pupils
35	///	3
36	~~////~~ /	6
37	~~////~~ ~~////~~ //	12
38	~~////~~ ///	8
39	/	1
40	//	2
41	/	1
42	/	1

Step 1
Arrange the shoe sizes in order of magnitude.

Step 2
Take each figure in the raw data and insert a tally mark (/) against the size which it falls. Note that every fifth tally mark is scored across the previous four.

Step 3
Total the tally marks to find the frequency of each size.

Activity 2

20 students in a class mentioned particular days of the week on which they were born. The result is shown in the table below.

Table 10: Students born on a particular day of the week

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Students born	2	2	1	4	5	3	3

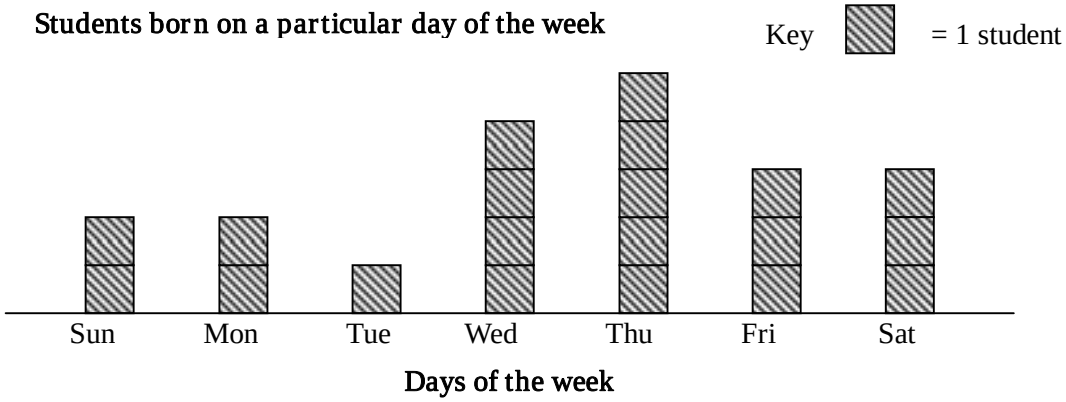
Draw a pictogram for this data.

Week	Students born on a particular day of the week
Sunday	♀♀
Monday	♀♀
Tuesday	♀
Wednesday	♀♀♀♀

Thursday	♀♀♀♀♀
Friday	♀♀♀
Saturday	♀♀♀

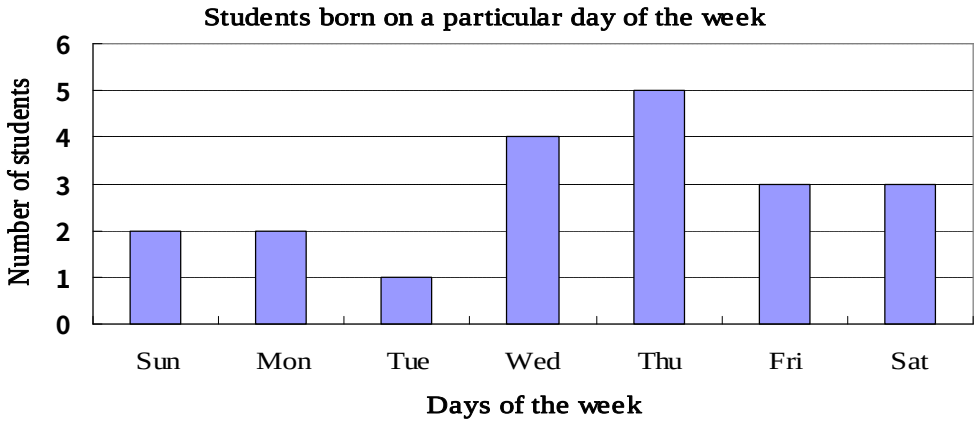
Activity 3

Draw a block graph to represent data in the table of Activity 2



Activity 4

Draw a bar graph to represent data in the table of Activity 2.



Practice 1

The weights of forty (40) pupils in a class are as follows;

24, 28, 26, 25, 23, 27, 22, 24, 28, 26, 27, 23, 28, 27,
30, 23, 22, 24, 28, 25, 29, 32, 25, 25, 20, 26, 29, 21,
24, 24, 24, 31, 29, 25, 30, 27, 28, 25, 25, 23,

1. Construct a frequency table using the data given above.
2. How many pupils weigh 30kg?
3. What is the difference in weight between the lightest and the heaviest?

Practice 2

The following marks were scored by pupils in a Mathematics test

7, 6, 4, 5, 8, 6, 6, 6, 4, 9, 5, 6, 5, 4, 7, 6, 6
5, 8, 6, 5, 6, 6, 5, 2, 7, 7, 6, 5, 4, 8, 6, 5, 6

1. Represent the data on a frequency table.
2. How many students scored the highest mark?
3. Find the mark which occurred most frequently.

Practice 3

After a survey, pupils' attendance at school was recorded as shown in the table below. Draw a vertical bar graph, using 2cm for the width of each bar and 1cm for the unit of attendance.

Table 11: Attendance of pupils at school

Class	P1	P2	P3	P4	P5	P6
Attendance	12	14	10	9	5	8

Practice 4

The table below shows the distribution of weights and number of pupils in a class. Draw a horizontal bar graph to represent this distribution.

Table 12: Distribution of masses

Weight (kg)	20	21	22	23	24	25	26	27	28	29	30	31	32
Number of pupils	1	1	2	4	6	7	3	4	5	3	2	1	1

Module 6: Sample Lesson Plans in Science

Users:

All personnel at the school level

Objectives of this Module:

Module 6 comprises sample lesson plans for challenging topics in Science.

The module also provides concise explanation of challenging topics at the beginning of the module. It briefly discusses the identification of challenging topics.

All the sample lesson plans are in accordance with the MOE Teaching Syllabus for Integrated Science (Primary 4-6).

The module has 2 types of sample lesson plans, type A and type B. The section on sample lesson plans of Type A has of 5 parts: **lesson overview, lesson plan, teaching hints, use of chalkboard** and **English as a teaching tool**. On the other hand, the section on sample lesson plans of Type B has 2 parts only: **lesson plan** and **English as a teaching tool**.

The lesson overview consists of introduction, objectives of the topic and the lesson, R.P.K. and details about the class. "Introduction" illustrates the importance and relevance of the lesson to real life. All the "objectives" are taken from the syllabus. "R.P.K." states relevant previous knowledge that pupils are expected to have. "Details about the class" describes the current situation of the class in terms of pupils' general information, academic progress, interest and attitude towards the subject. Further explanation about these can be found in Module 4 (4. Lesson Plan).

The lesson plan (sometimes also called lesson notes) is included in both Type A and Type B. The format of the lesson plan is the same as the standard lesson plan that GES provides.

The sample lesson plans of Type A also contain "lesson plan with teaching hints" on the next page of the standard lesson plan. The lesson plan with teaching hints is the same as the standard lesson plan on the previous page except for the speech blobs (rounded rectangular shapes) on the lesson plan. The speech blobs suggest where each of the teaching hints can be used.

The teaching hints provide suggested teaching approaches. It is designed in a such a way that each of the teaching hints elaborates how to deliver a particular teaching activity (e.g. Introduction, Activity 1,2…) in the development of a lesson. Because many of these teaching activities are linked with the core points of the lesson, successful delivery of the teaching activity should lead to a sound understanding of the core points.

The teaching hints deal mainly with general teaching approaches and questioning skills for particular teaching activities. The general teaching approaches describe how the teacher can lead pupils to the core points through the activities. When the activity is an experiment, the teaching approach explains how to conduct the experiment, paying special attention to the process skills of Science. The questioning skills should also help the teacher to lead pupils to reach a good understanding of the core points. It is recommended that teachers develop better teaching approaches and questions for the lesson and other lessons once they get the ideas that the teaching hints discussed/presented.

The use of chalkboard shows a suggested chalkboard plan. Well-organized chalkboard helps pupils understand what they are learning in the lesson. Teachers need to consider how to use and organize the chalkboard, and this part can help them consider such planning.

The section **English as a teaching tool** suggests effective use of English language in the Science

lessons. The section gives examples of English that can be used in particular activities. By using the actual content of the sample lessons, it helps pupils to understand Science content better. It should be noted that a section of Module 4 highlights the use of English language as a teaching tool for other subjects, with a general and rather theoretical explanation of its use.

Use of Modules 6 for SBI/CBI demonstration activity (lesson)

The CL and teachers can simply use some of the sample lesson plans for their SBI/CBI. They can also develop their own lesson plans for challenging topics using one of the samples as a model. Once CL and teachers have become familiar with the sample lesson plans and their teaching and learning strategies, it is strongly recommended that CL and teachers start developing their own initiated lesson plans for challenging topics.

Adding Lesson Plans developed by CL and teachers

Module 6 should be built-up by adding more sample lesson plans. CL and teachers must be encouraged to develop these lesson plans. CL and teachers have opportunities to develop lesson plans for challenging topics when preparing their SBI/CBI. Besides, CL can improve lesson plans when discussing the challenging topics with other CLs in CL Sourcebook Training.

Some of the lesson plans developed by CL and teachers will be added to the modules.

Table of Contents:

Version:	1.00

Identification of Challenging Topics

Introduction

Some teachers in primary schools think that some topics are difficult or challenging to teach. They call the topics **challenging topics**. The teachers claim that the topics require subject teachers or specialists to teach them. However, with adequate preparation, teaching these topics should not be problematic. It is a matter of preparation not qualification. A little bit of extra effort and time to prepare a lesson makes a big difference and helps teachers to improve their lessons greatly.

This section provides some useful information about challenging topics for CLs and teachers. It helps to identify challenging topics.

Preferred Topics

It is important to examine topics that teachers prefer to teach. When we understand why we prefer certain things, it becomes easier to see why we do not prefer other things. The preferred topics and the reasons for preferring those topics can help us to see why some topics are regarded as challenging.

Teachers in Primary schools seem to prefer teaching some topics in Science. Some examples are:

Food, Plants, Animals, the Family and the Community

There are some reasons why primary school teachers prefer teaching the topics listed above to others. They are shown below.

- The topics present real and familiar things.
- There are relevant curriculum materials and teaching/learning materials to use in lesson delivery.
- Local teaching and learning materials could be used.
- Teachers have interest in teaching familiar topics.
- The topics lend themselves to the use of the activity method of teaching.

Challenging Topics in Science

The following are some examples of challenging topics in Science. These are based on opinions gathered from serving teachers at the primary school level.

Earthquakes, Formation of Clouds, Forces, Electrical Circuits, Constraints to Healthy Living: HIV/AIDS, Body Framework of Mammals, Magnets and non-magnets, Reflection of Light, Dispersal of Fruit and Seed, Pollination and Fertilization in Plants

It seems that the reasons why teachers perceive some topics as challenging vary from teacher to teacher. However, some typical reasons are identifiable. For example, one of the reasons is that challenging topics are seen to be abstract because they are not seen in real life situations. Another reason can be that challenging topics lack relevant curriculum materials that teachers can use as resource materials. The following are some of the reasons some teachers gave for regarding certain topics as challenging.

- Difficulty in getting Science and Environmental Studies experts to support teachers to teach the challenging topics.
- Lack of relevant teaching/learning materials to teach the challenging topics.
- Inadequate funds for purchasing some teaching/learning materials e.g. consumable materials.
- Some teachers' level of interest in Science and Environmental Studies.
- The problem of untrained teachers who lack content knowledge in Science and skills to handle Science and Environmental Studies.
- Large class sizes do not lend themselves to the activity method of teaching.

- Inadequate preparation by the teachers.
- Inadequate practical lessons in pre-service training at colleges due to the emphasis on passing of examination.

Summary

The challenging topics are seen to be abstract in nature. Besides, there are no teaching/learning materials and relevant curriculum materials to support teachers to teach such topics. Some teachers use inappropriate teaching methodology, and large class size makes the use of the activity method of teaching difficult.

These problems can be overcome by adopting good strategies in the teaching/learning processes.

The fundamental principle that underlies the INSET programme is that teachers learn effectively through sharing implementation and discussion of a lesson with their colleagues. Thus, the CL and teachers should utilise the opportunities for lesson implementation and post-lesson discussion at SBI/CBI and CL Sourcebook Training to treat challenging topics.

Sample Lesson Plans (TYPE A)

Lesson 1: Properties of Soil (Primary 5)

1. Lesson overview
2. Lesson plan
3. Teaching hints
4. The Use of Chalkboard
5. English as a teaching tool

Lesson 2: Characteristics of Water and Other Liquids (Primary 4)

1. Lesson overview
2. Lesson plan
3. Teaching hints
4. The Use of Chalkboard
5. English as a teaching tool

Lesson 1: Primary 5, Unit 2 Properties of Soil

1. Lesson Overview

Introduction

Soils are very common in our environment. Pupils see different kinds of soil on their way to school. Many pupils have played with soil at some stage in their growth/development, touching and feeling them with their hands. Some of them know that soils support plants and can be used in building houses and roads (taught in Primary 4). From these experiences, it is obvious that soils are reasonably familiar things to the pupils; however, many pupils do not pay particular attention to its characteristics. It is important to know about the characteristics of soil because it often determines which soil is more preferable for a specific use. For example, some particular kinds of soil are useful for growing certain types of crops. Having a good understanding of the characteristics of soil is very helpful for farming.

In this lesson on Properties of Soil, pupils are expected to observe and classify different types of soil. They are to consider the uses of soil in our everyday life, and then explore which soils are best for various crops.

The teacher can organise group activites depending on the class size and the nature of the activities.

The teacher should move around in the class when pupils are working on the activities, spending ample time with them and paying attention to them.

General Objectives of the Topic (Soil in Primary 5)

The pupil will

- acquire basic knowledge about soil.
- acquire skills in controlling soil erosion.
- understand the importance of soil in crop production.

Specific Objectives of the Lesson (Properties of Soil)

By the end of the lesson, pupils will be able to:

- determine at least two differences among loamy, sandy and clayey soils.
- demonstrate the water holding capacity of loamy, sandy and clayey soils.

This topic (properties of soil) is found in Unit 2 of the primary 5 syllabus. It deals with how a sample of soil can retain water or allow water to pass through it. The units that pupils learn before and after this unit are shown in Table 1. The table also indicates the place of the topic, Properties of Soil, **in bold**.

Table 1: Class and Unit that this topic can be found

Class	Unit
Primary 4	Unit 1:Composition and uses of soil
Primary 5	Unit 1: Types of soil **Unit 2: Properties of soil** Unit 3: Soil erosion – causes, effects and control
Primary 6	Unit 1: Land degradation Unit 2: Soil fertility

Relevant Previous Knowledge (R.P.K.)

Pupils are familiar with the type of soil in the school garden.

In Primary 4, pupils have already learnt the following:

- Soil is made up of particles of stone and other materials like dead plants, animals and air.
- Soil supports plants.
- Soil is useful in crop production.
- It can also be used in building houses and roads.
- Soil can be used in making pots, bowls and ovens.

In Primary 5 in previous lessons, pupils have already learnt the following.

- Soil can be grouped into sandy, clayey and loamy.

However, a teacher should not assume that all pupils in the class have a good understanding of the above because they have previously learnt them. It is always important to pay enough attention to the individual needs of the pupils.

Details about the Class

The "Details about the Class" explains the current situation of the class in terms of general information about the pupils, academic progress, interest in the subject and attitude towards the subject.

(Refer to Module 4: **4.1.3. "Details about the Class"** for further explanation.)

(This is an example)

This class is made up of 50 pupils (28 girls and 22 boys). Majority of the pupils seem to have a good understanding of the uses of soil while a few pupils have a strong interest in the characteristics of soil. Approximately half of them have had some kind of farming experience with their parents. Although all of them participated in the previous lesson that dealt with grouping soil into sandy, clayey and loamy, roughly 10 of them are still struggling with how to group them.

The next section shows samples of lesson plans taken from the primary school syllabus. Some of them present the format with suggested teaching and learning activities. Others have suggested teaching hints added to certain parts of the lessons and are intended to help the teacher to achieve the core points for the various stages of the lesson.

2. Lesson Plan

PROPERTIES OF SOILS

SUBJECT: Integrated Science **REFERENCES**: 1. Primary School Integrated Science Syllabus pg 38-39
CLASS: Primary 5 **DETAILS ABOUT THE CLASS**: Majority of the pupils seem to have a good understanding of the uses of soil while a few pupils have a strong interest in the characteristics of soil.

DAY/DATE/TIME/DURATION	TOPIC/ SUB-TOPIC	OBJECTIVES/ R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
Wednesday 2nd of Oct. 06 11:00~ 60 mins	**TOPIC**: TYPES OF SOIL. **SUB-TOPIC:** PROPERTIES OF SOIL.	**OBJECTIVES:** By the end of the lesson pupils will be able to: – determine two differences in loamy, sandy and clayey soils; – demonstrate the water holding capacity of loamy, sandy and clayey soils. **R.P.K.:** Pupils are familiar with the type of soil in the school garden.	**TLM**: loamy, sandy, and clayey soils, funnels, cotton wool, empty transparent plastic containers, water, cups, sticks **INTRODUCTION** Short talk or discussion about real life experiences related to water holding capacity. (eg: erosion of sports grounds of the school) Through question and answer method, pupils state the types of soil near their houses and in the school garden. **ACTIVITY 1:** Pupils touch/feel and describe the soil samples in terms of colour, texture, and particle size and record their observations in a table. **ACTIVITY 2:** Using the same type of soil samples, pupils find out if the different types of soil allow water to pass through them at the same rate. Let the group leaders read out their observations and discuss their groups' findings with the class. For the instructions, refer to worksheet or teaching approach on an attached paper. **APPLICATION**: Pupils discuss which soil will be best for planting in the school garden or their gardens at home (Note that different kinds of plants also determine suitable soil type.) **CONCLUSION:** e.g. Loamy soil is suitable for growing cabbage.	**CORE POINT 1:** Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish or brownish in colour depending on its location. It feels very smooth and has medium size particles. **CORE POINT 2:** Different soils allow water to drain through them at different rates. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil. **CORE POINT 3:** Clayey soil retains water most while loamy soil holds sufficient water for plant growth.	ORAL QUESTIONS: What type of soil is in the school garden? What type of soil is on the school compound? What is the colour of the soil in the school garden? WRITTEN QUESTIONS: There are 3 main types of soil. Which soil type will dry up more quickly and why? Which soil would be best for growing crops in the school garden and why?

Lesson Plan with Hints

The lesson plan below shows speech blobs (rounded rectangular shapes) that indicate hints for teaching the various stages. The hints for teaching deal with specific skills for lesson delivery and they are explained in detail in the following pages. The position of each speech blob suggests where each one of the hints can be used.

Hints for Introduction

DAY/ DURATION	TOPIC/ SUB-TOPIC	OBJECTIVES/ R.P.K	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
Wednesday 60MINUTES	**TOPIC**: TYPES OF SOIL. **SUB-TOPIC:** PROPERTIES OF SOIL.	**OBJECTIVES:** By the end of the lesson pupils will be able to: – determine two differences in loamy, sandy and clayey soils – demonstrate the water holding capacity of loamy, sandy and clayey soils. **R.P.K.:** Pupils are familiar with the type of soil in the school garden.	**TLM**: loamy, sandy, and clayey soils, funnels, cotton wool, empty transparent plastic containers, water, cups, sticks **INTRODUCTION**: Short talk or discussion about real life experiences related to water holdinng capacity. Through question and answer method, pupils state the types of soil near their houses and in the school garden. **ACTIVITY 1:** Pupils touch/feel and describe the soil samples in terms of colour, texture, and particle size and record their observations in a table. **ACTIVITY 2:** Using the same type of soil samples, pupils find out if the different types of soil allow water to pass through them at the same rate. Let the group leaders read out their observations and discuss their groups' findings with the class. **APPLICATION**: Pupils discuss which soil will be best for planting in the school garden, or their gardens at home. (Note that different kinds of plants also determine suitable soil type.) **CONCLUSION:** e.g. Loamy soil is suitable for growing cabbage.	**CORE POINT 1:** Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish or brownish in colour depending on its location. It feels very smooth and has medium size particles. **CORE POINT 2:** Different soils allow water to drain through them at different rates. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil. **CORE POINT 3:** Clayey soil retains water most while loamy soil holds sufficient water for plant growth.	ORAL QUESTIONS: What type of soil is in the school garden? What type of soil is on the school compound? What is the colour of soil in the school garden? WRITTEN QUESTIONS: There are 3 main types of soil. Which soil type will dry up more quickly and why? Which soil would be best for growing crops in the school garden and why?

Hints for Activity 1

Hints for Activity 2

Hints for Application

3. Teaching Hint

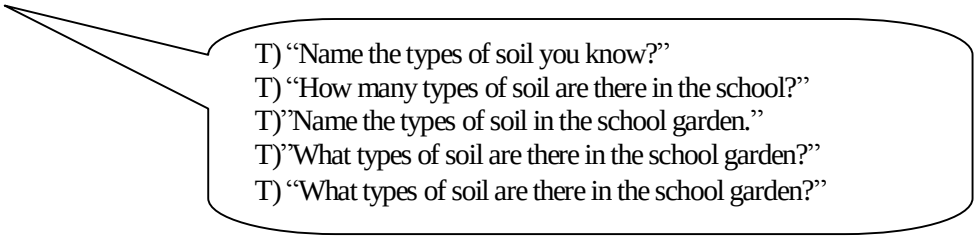
The discussion that follows is the suggested teaching approaches for presenting the lesson whose lesson plan can be found on the previous page.

Hints for Introduction

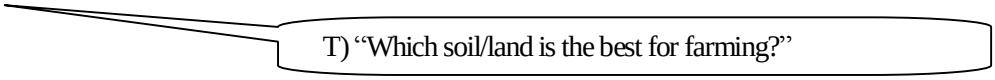
Questioning Skills for Introduction

In the introduction, the teacher can use any (or all) of the approaches below.

a) questions that review pupils' R.P.K.
Example



b) questions that relate the lesson to real life situations.
Example



Note: Different crops do well in different soils so any soil type mentioned should be supported with the appropriate crops. Eg. sandy soil – shallot/onions; humus- pepper.

Hints for Activity 1

Activity 1 is linked with Core Point 1. Hints for Activity 1 lead to a good understanding of Core Point 1.

Core Point 1 (of Activity 1): Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish in colour. It feels very smooth and has small size particles. Loamy soil has particles with a mixture of sizes and is black in colour.

Approach to Activity 1 (for Core Point 1):

An approach to Activity 1 is shown below as an example.

1. Three soil samples (sandy, clayey and loamy soils) are needed for this activity and they can be obtained from the school garden and the neighborhood.
2. In groups, pupils examine the samples carefully.
3. Pupils touch/feel and describe the colour, particle size and texture of the three samples of soils.
4. Pupils record their observations in Table 2.
5. Discuss pupils' observations and classify the soil types according to the size of particles and texture.

Table 2: Properties of soil types

Type of soil	Colour	Size of particles	Feel or texture
Sandy			
Clayey			
Loamy			

Questioning Skills for Activity 1

In Activity 1, pupils have opportunity to make their own observations. A teacher should use questions that elicit the observations pupils have made. (See Module 4 General Pedagogy: 2.5 "Questioning Skills" for further explanation.)

Examples

T) "What is the colour of this soil?"
T) "How does it feel when you touch the soil?"
T) "How will you describe the texture of clay?"
T) "How big is the size of the soil particles?"
T) "How different is sand from clay?"

Hints for Activity 2

Activity 2 is linked with Core Point 2. Hints for Activity 2 lead to a good understanding of Core Point 2.

Core Point 2 (of Activity 2): Different soils do not allow water to drain through them at the same rate. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil.

Approach to Activity 2 (for Core Point 2)

An approach to Activity 2 is shown below as an example.

1. Using the soil samples, pupils find out if the different types of soil allow water to pass through them at the same rate.
2. Let pupils predict what would happen to the water in the three types of soils (Pupils can be asked to write it down).
3. Pupils or group leaders present their predictions to the class. (Teacher writes them on chalkboard).
4. Carry out the experiment (Either teacher-led demonstration or group activity, depending on availability of the apparatus and time).
5. As a group, pupils record the results on the board or in their exercise books
6. Pupils share the results with members of other groups.
7. Discuss them in class, comparing them with the predictions pupils made before the experiment.

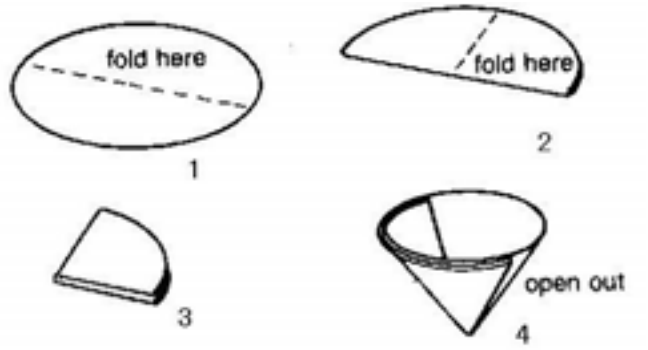
Preparation of Teaching and Learning Materials for the lesson

Resources:

- 3 different transparent containers of equal size (beakers/ plastic bottles/ glasses)
- Samples of sandy, clayey and loamy soils (which are locally available.)
- Filter paper/a piece of paper/ cotton wool
- 3 funnels
- A clock/stop watch/wrist-watch

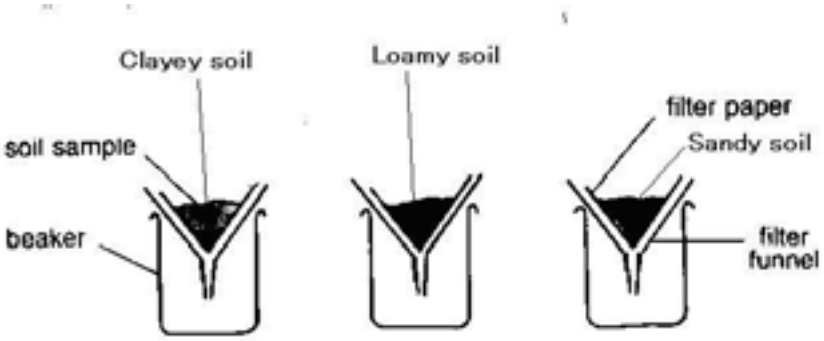
Steps to follow:

1.Fold the filter paper as shown.

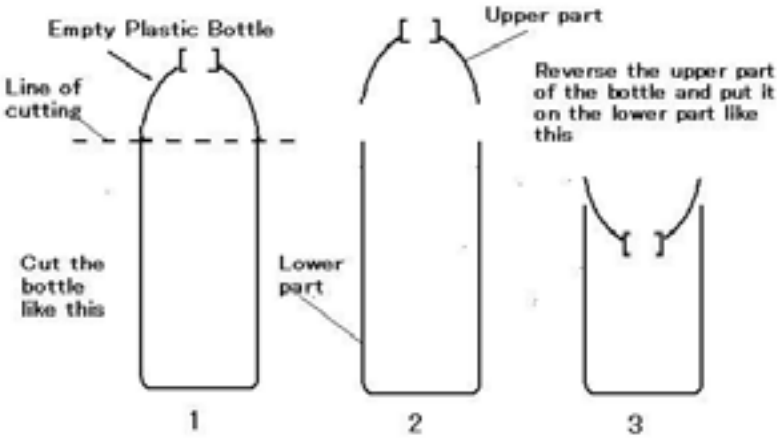


When filter paper is not available, we can improvise it. Instead of filter paper, we can use cotton wool or a piece of tissue from toilet roll.

2. Set up the apparatus.



When funnels and beakers are not available, other materials can be used, catering for the same purpose. A teacher can improvise them. One other example, which uses empty plastic bottles, is shown below.



Questioning Skills for Activity 2(Core Point 2)

In Activity 2, pupils are given the opportunity to carry out an experiment that focuses on discovery. This activity allows a teacher to use a variety of questions, including high order questions, such as analysis, synthesis and application questions.

The teacher can also highlight some of the process skills in this activity, asking questions that are related to process skills. Examples of these questions and process skills are shown below. (See Module 4: 2.3.2 Generic/Process Skills and Science for further explanation.)

Example

Question	Process Skill
"What is likely to happen?"	Predicting
"Which type of soil is likely to hold water the longest?"	Predicting
"Why will the clayey soil hold water longest?"	Hypothesising
"How will you group the soils?"	Classifying
"What will you need to make this experiment fair?"	Handling apparatus
"How would you do it?"	Designing
"What will you measure?"	Measuring
"How will you record the results?"	Recording (Writing)
"How will you share your results?"	Reporting/communicating

Hints for Application

Application is linked with Core Point 3. Hints for Application leads to a good understanding of Core Point 3.

Core Point 3 (of Application): Clayey soil retains water most while loamy soil holds sufficient water for plant growth.

Approach to Application (for Core point 3)

An approach to application is shown below as an example.

1. Having obtained the findings that pupils got from Activity 2, pupils discuss the soil type that retains water most.
2. Teacher asks which soil is best for growing crops.
3. Teacher guides the pupils through the information to discover that crops need just sufficient amount of water. It should neither be too little nor too much.
4. Through a discussion on which soil is best for growing crops, let pupils synthesise both the information that they obtained from the activity and the information their teacher has just given.
5. After pupils come to a conclusion, teacher asks if the type of soil in the school garden is suitable for growing crops.
6. Encourage pupils to suggest the types of soil that would be best or suitable for planting a local crop.

Questioning Skills for Generating Application of the Concept

A teacher can use the following questions for summing up the lesson. Example

Question	Process Skill
"What have you found?"	Evaluating
"How do you compare the results?"	Discussing
"What might be said about the relationship between water holding capacity and size of participles of soil?"	Generalising
"How will you tell your friends about today's finding?"	Communicating

Related Information

The smaller the particles of soil, the greater the total surface area of the particles on which the water can collect. The further apart the particles, the more easily water passes through.

Clayey soil has very small particles and holds water better than sandy and loamy soils, but it tends to become waterlogged and develops cracks when dry.

Sandy soil holds little water because it has large spaces between its particles.

Loamy soil holds water well. It does not become waterlogged. Humus also increases the water holding ability of soils.

"The ability of soil to hold back water is called the water holding/ retention capacity of the soil."

4. The Use of Chalkboard

A sample layout of chalkboard writing is shown below.

3rd/May/06

Properties of Soil

Types of soil we can find in the school garden.
Examples: Sand, clay, loam and so on.

Activity 1: Properties of Soil

Types of soil	Colour	Size of particles	Feel or texture
Sandy			
Clayey			
Loamy			

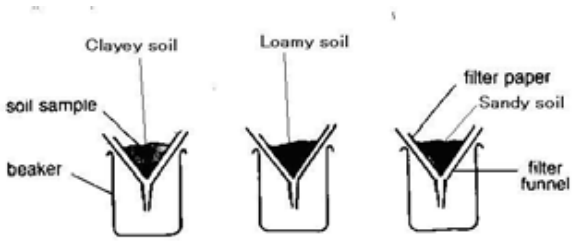
Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish or brownish in colour depending on its location. It feels very smooth and has medium size particles.

Activity 2: Which soil allows water to pass through it more easily?

Materials: TLM: loamy, sandy, and clayey soils, cotton wool, funnels and beakers (or empty transparent plastic containers), water, cups, sticks

Aim: To find out if the different types of soil allow water to pass through them at the same rate.

Set-up:



Predictions:

Group A: Clay allows water to pass through it faster than others.

Group B: There is no difference. They are all the same.

Group C: Water passes through sand at the fastest rate.

Group D: Different soils do not allow water to drain through them at the same rate.

Result:

Table: Results of the Experiment

Type of Soil	What happened to the water after 3 minutes?
Clay	
Sand	
Loam	

Conclusion (of activity 2):

Allow water to pass through them at different rates. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil.

Application and Conclusion:

Clayey soil retains water most while loamy soil holds sufficient water for plant growth.

Loamy soil is suitable for growing cabbage.

Exercise:

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5. English as a Teaching Tool

(a) Activity 1: In the first activity of this lesson, the pupils have to describe the feel or texture of the three soil samples. The pupils will be able to describe the soils in their local language. The teacher can help the pupils to learn some English words to describe the differences.

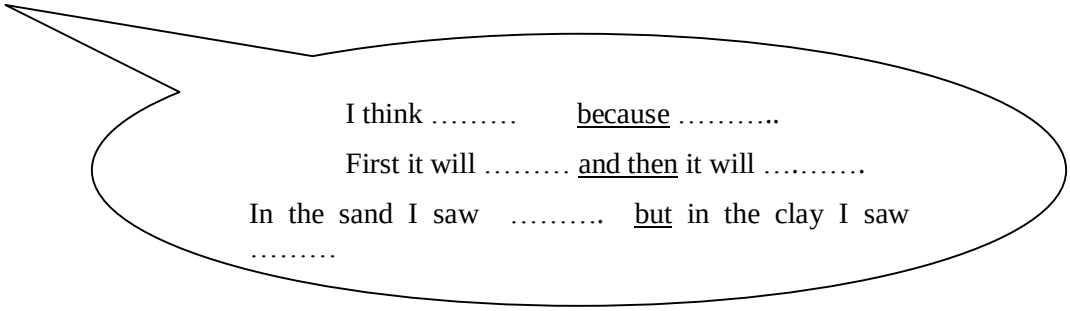
The following descriptive words will be helpful:

clay	sand	loam
small grains smooth sticky (grains stick together) You can make it into a ball	bigger grains rough You can pour it It runs through your fingers	crumbly loose a mixture of textures bigger and smaller pieces together

(b) Activity 2: In this lesson the pupils are asked to write down what they think will happen before they do the experiment. After the teacher has explained the experiment she should give the pupils some ideas and some words to help them. For example the teacher can say:

"Do you think it will be the same for each type of soil? What will be different? Will the water pass through one type of soil quickly and move through another type of soil more slowly? Now I want you to write down some sentences to say what you think will happen in this experiment. Here are some words that you can use in your writing" eg. Fast, slowly, quickly, holds, doesn't hold.

Encourage the pupils to explain their ideas fully using the following sentence structures:



It is important for the teacher to give clear instructions for the pupils to follow, using phrases which they have heard before so that they become familiar with what they are expected to do.

For example:

- Give a clear title which tells the pupils what they are going to be studying.
- Tell the pupils what equipment is needed for the experiment.
- Make the instructions brief, in simple steps and in clear English.

Each of these points will also provide a list of vocabulary items to help pupils with their writing.

The experiment could be written on the blackboard for the pupils to copy into their exercise book (see below).

Experiment : To Investigate How Different Soils Hold Water

What you need: three pieces of cloth, three samples of soil, three sieves, three equal quantities of water, three containers, a clock or timer.

Step 1 Put a piece of cloth in a sieve. Do the same with two other sieves.

Step 2 Put each sieve at the mouth of a container.

Step 3 Label the sieves A, B and C.

Step 4 Put some sand on sieve A.

Step 5 Put the same quantity of clay on sieve B.

Step 6 Put the same quantity of loam on sieve C.

Step 7 Pour the same amount of water onto each sieve.

Step 8 Note the time. After 3 minutes, observe which type of set-up has most water in the sieve and which type of set-up has most water in the container.

Step 9 Record your findings in the table below.

Table 3: Results of the Experiment

Type of Soil	What happened to the water after 3 minutes?
Clay	
Sand	
Loam	

Lesson 2: Primary 4, Unit 2: Characteristics of Water and Other Liquids

1. Lesson Overview

Introduction

Water is the most common liquid in the world. We drink it, wash in it and do many things with it. In many ways water controls our lives. It determines where we can live and whether we can grow crops for food and also determines which weather we have. All living things use water- plants, animals and people. About 2/3(70%) of the human body is made up of water. The body needs about 2 litres every day. Water forms part of our food and drinks. It replaces the water that is lost through sweat, urine and breathing. Water is more important than food (you can survive between 5 to 10 days only without water but can do for 50 to 60 days even without food if you have water). Water is a compound with chemical formula H_2O (2 Hydrogen atoms and 1 Oxygen atom).

General Objectives of the topic (Water in primary 4)

The pupil will:

- recognise various sources of water.
- relate water to other liquids.
- appreciate the importance of water.
- understand the dangers associated with polluting water bodies.

Specific Objectives of the lesson (Characteristics of water and other liquids)

By the end of the lesson, pupils will be able to:

- identify water from other liquids.
- compare water to some other liquids.

This topic (Characteristics of Water and other Liquids) is found in Unit 2 of the primary 4 syllabus. The units that pupils learn before and after this unit are shown in Table 4. The table also indicates place of the topic, Characteristics of Water and other Liquids, **in bold**.

Table 4: Class and Unit that this topic can be found

Class	Unit
Primary 4	Unit 1:Sources of water **Unit 2: Characteristics of water and other liquids** Unit 3: Uses of water Unit 4: Water pollution
Primary 5	Unit 1: Purification of water Unit 2: Water as a solvent Unit 3: Water cycle

Relevant Previous Knowledge (R.P.K.)

Pupils use water and other liquids (e.g. kerosene and fruit juice) in their everyday activities.

In Primary 4, pupils have learnt that:

- Water may be obtained from rivers, taps, wells, lakes, lagoons, streams, rain and the sea.
- Water may contain different kinds of impurities.

However, the teacher should not assume that all pupils in the class have a good understanding of the above. It is always important to pay enough attention to individual needs of pupils.

Details About the Class

The "Details about the Class" explains the current situation of the class in terms of general information about the pupils, academic progress, interest in the subject and attitude towards the subject.
(Refer to Module 4: 4.1.3. **"Details about the Class"** for further explanation.)

(This is an Example)

This class is made up of 58 pupils (33 girls and 25 boys). Majority of the pupils know the basic differences among the liquids that will be used in the lesson. However, many of them have difficulty in expressing them in English words. Special attention is needed to develop the pupils' understanding of these English vocabularies. The concepts of thickness and thinness are to be developed. Some pupils are very much familiar with kerosene but there are some who have not touched it before. Pupils have learnt about the sources of water in the previous lesson, and understand that water may contain different kinds of impurities. Thus, it is important to stress that the water discussed in this lesson is pure water, without impurities, so as not to confuse the pupils.

2. Lesson Plan

WATER AND OTHER LIQUIDS

SUBJECT: Integrated Science **REFERENCES:** 1. Primary School Integrated Science Syllabus pg 9
CLASS: Primary 4 **DETAILS ABOUT THE CLASS:** Special attention is needed to develop the pupils' understanding of the English vocabularies that explain the differences among the liquids.

<table>
<tr><th>DAY/DATE/TIME/DURATION</th><th>TOPIC/ SUB-TOPIC</th><th>OBJECTIVES /R.P.K.</th><th>TEACHING/LEARNING MATERIALS
TEACHER/LEARNER ACTIVITIES</th><th>CORE POINTS</th><th>EVALUATION/ EXERCISE</th></tr>
<tr>
<td>WED.

1st of Oct. 06

9:00～
30mins.</td>
<td>TOPIC:
Water and other liquids

SUB-TOPIC:
Characteristics of water and other liquids</td>
<td>OBJECTIVES:
By the end of the lesson, pupils will be able to:

- identify water from other liquids

- state at least 2 differences between water and other liquids.

R.P.K:
Pupils use water and other liquids in their every day activities.</td>
<td>TLMs:
Water, orange juice, kerosene, cooking oil, e.g. palm oil in transparent bottles with lids, stop watch, rulers, marker, pen, and funnel.
INTRODUCTION:
Lesson is introduced through Q and A, for example,
"What kind of liquid do you use in making stew?"<br>"Do all liquids have taste, smell and colour?"

ACTIVITY 1: Group activity
In groups, pupils compare the liquids, looking at the differences in colour, smell and texture (thick/thin). Complete the table.
<table>
<tr><th rowspan="2">Liquid</th><th colspan="2">Colour</th><th colspan="2">Smell</th><th colspan="2">Texture</th></tr>
<tr><th>With colour</th><th>Without colour</th><th>With smell</th><th>Without smell</th><th>Thick</th><th>Thin</th></tr>
<tr><td>Water</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Cooking oil</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Orange Juice</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Kerosene</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td>
<td>CORE POINT 1:
Some liquids have colour. (eg. Orange juice)
Others have taste and smell.(eg. Kerosene)
Pure water is colourless, odourless and tasteless.</td>
<td>State 2 differences between water and cooking oil.

Which liquid has coloured: kerosene or orange juice?

Water flows more slowly than cooking oil. True or False?</td>
</tr>
</table>

ACTIVITY 2: Demonstration

The teacher and pupils use TMLs to demonstrate an activity to find out which liquid pours more easily than others.

Procedure:

1. Obtain two identical plastic bottles and place a funnel on each.
2. Mark each bottle equally.
3. Measure some water and put it into one of the bottles through the funnel.
4. Time it and check how long it takes to reach the mark.
5. Repeat the activity with the cooking oil.
6. Copy and complete the table.

Liquid	Time it takes to reach the mark (In seconds)	Does it flow fast or slow?		How does it feel between your fingers?	
		Fast	Slow	Thick	Thin
Water					
Cooking Oil					

APPLICATION:

"You got water from a borehole in your neighborhood. How would the water be different from water from a river or muddy pond?"

CORE POINT 2:

Some liquids flow more slowly than others. Cooking oil flows more slowly than water.

Lesson Plan with Hints

The lesson Plan below has speech blobs (rounded rectangular shapes) that show hints for teaching approaches. The hints for teaching approaches deal with specific skills of lesson delivery and they are explained in detail in the following pages. The position of each balloon indicates where each one of the hints can be used.

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<td>WED.

60mins.</td>
<td>TOPIC:
Water and other liquids

SUBTOPIC:
Characteristics of water and other liquids</td>
<td>OBJECTIVES:
By the end of the lesson, pupils will be able to:

- identify water from other liquids,

- state at least 2 differences between water and other liquids.

R.P.K.:
Pupils use water and other liquids in their every day activities.</td>
<td>TLMs:
Water, orange juice, kerosene, cooking oil in transparent bottles with lids, stop watch, rulers, marker, pen, and funnel.
INTRODUCTION:
“What kind of liquid do you use in making stew?”
“Are all liquids tasteless and odourless?”
ACTIVITY 1: Group activity
In groups, pupils compare the liquids, looking at the differences in colour, smell and texture (thick/thin). Complete the table.
<table>
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<tr><th>With colour</th><th>Without colour</th><th>With smell</th><th>Without smell</th><th>Thick</th><th>Thin</th></tr>
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<tr><td>Kerosene</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Hints for Activity 1
</td>
<td>CORE POINT 1:
Some liquids have colour.
Others have taste and smell.
Pure water is colourless, odourless and tasteless.</td>
<td>State 2 differences between water and cooking oil.

Which liquid is coloured, kerosene or orange juice?

Water flows more slowly than cooking oil.True or False?</td>
</tr>
</table>

ACTIVITY 2: Demonstration

The teacher demonstrates an activity to find which liquid pours more easily than others.

Procedure:

1. Obtain two identical plastic bottles and place a funnel on ea
2. Mark each bottle equally.
3. Measure some water and put it into one of the bottles through the funnel.
4. Time it and check how long it takes to reach the mark.
5. Repeat the activity with the cooking oil.
6. Copy and complete the table.

Liquid	Time it takes to reach the mark (In seconds)	Does it flow fast or slow?		How does it feel between your fingers?	
		Fast	Slow	Thick	Thin
Water					
Cooking Oil					

APPLICATION:

"You got water from a borehole in your neighborhood. How would the water be different from water from a river or muddy pond?"

CORE POINT 2:

Some liquids flow more slowly than others. Cooking oil flows more slowly than water.

Hints for Activity 2

Also See "the Use of Chalkboard".

3. Teaching Hints

Hints for Activity 1

Activity 1 is linked with Core Point 1. Hints for Activity 1 lead to a good understanding of Core Point 1.

Core Point 1(of Activity 1): Some liquids have colour. Others have taste and smell.

Approach to Activity 1(for Core Point 1)

An approach to Activity 1 is shown below as an example.

Comparing liquids

Materials: 1. Water 2. Kerosene 3. Orange juice 4. Cooking oil (eg. Palm oil) 5. Transparent bottles with lids

Procedure: Look at the samples of different liquids.

Safty: **DO NOT** taste any of the liquids.

Complete the table below.

Table 5 Comparing liquids

Liquid	Colour		Smell		Texture	
	With colour	Without colour	With smell	Without smell	Thick	Thin
Water						
Cooking oil						
Orange Juice						
Kerosene						

Questioning Skills for Activity 1

T) "Do they have colour or they are colourless? "
T) "Do they smell?"
T) "Do they feel thick or thin?" (After rubbing a little of each between your fingers.)

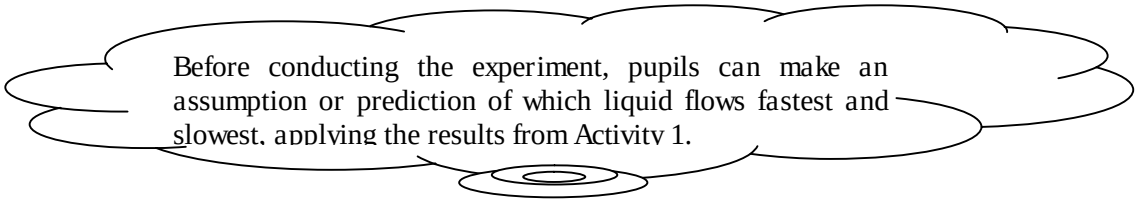
Hints for Activity 2

Activity 2 is linked with Core Point 2. Hints for Activity 2 lead to a good understanding of Core Point 2.

Core Point 2(of Activity 2)**:** Some liquids flow more slowly than others. Cooking oil flows more slowly than water. Pure water is colourless, odourless and tasteless.

Approach to Activity 2 (for Core Point 2)

An approach to Activity 1 is shown below as an example.



Which liquid pours more easily?

Materials: Water, cooking oil (eg. palm oil), plastic bottles, ruler, marker, stopwatch (a stopwatch/clock/wrist watch), funnels,

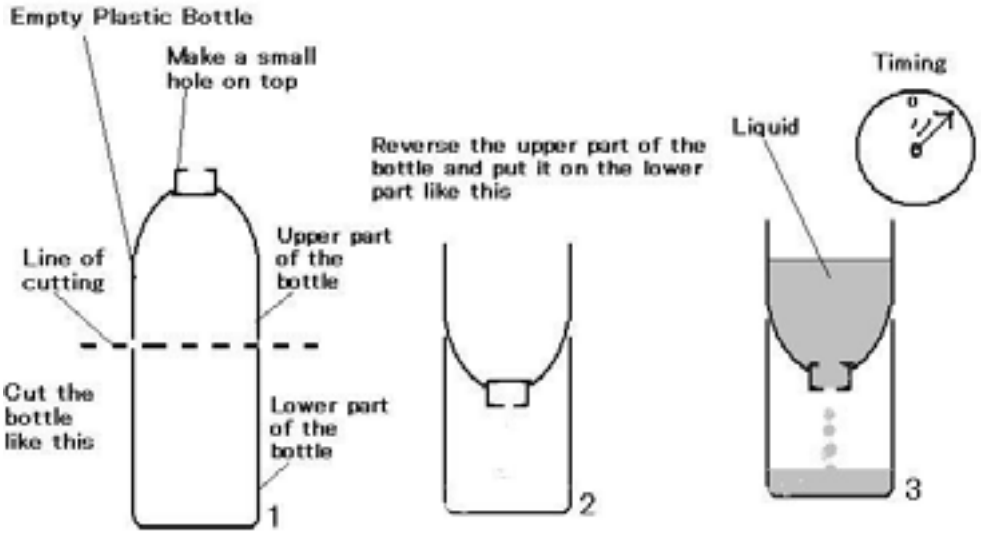
Procedure

1. Obtain two identical plastic bottles and place a funnel on each.
2. Mark each bottle equally.
3. Measure some water and put it into one of the bottles through the funnel.
4. Time it and check how long it takes to reach the mark.
5. Repeat the activity with the cooking oil.
6. Copy and complete Table 6.

Table 6: Which liquid flows faster?

Liquid	Time it takes to reach the mark (In seconds)	Does it flow fast or slow?		How does it feel between your fingers?	
		Fast	Slow	Thick	Thin
Water					
Cooking Oil					

When funnels are not available, empty plastic bottles can be used instead. An example of the construction of the apparatus is shown below.



Questioning Skills for Activity 2

T) "Why must the bottles be identical?"
T) "Why must the same volume of each liquid be used?"

Related Information

Pure water is colourless, odourless (has no smell) and is tasteless. Some other liquids like kerosene, fruit juice and edible oils have colour, smell and taste.

At atmospheric pressure, pure water:

- freezes at 0°C.
- is neutral to litmus.
- boils at 100°C.
- has a maximum density of 1g/cm^3 at 4°C.
- is a poor conductor of electricity (but becomes a good conductor when a small amount of an ionic compound is dissolved in it).
- expands between 4°C and 0°C and contracts (becomes less in volume) when melting from 0°C to 4°C so usually, solid water (ice)floats on liquid water.
- has a high surface tension so that it appears to form a strong skin on its surface.

Water is capable of dissolving many substances and it is therefore referred to as a **universal solvent**.

NB: Dissolved solids, such as salt and sugar raise the boiling point and lower the freezing point of pure water.

4. The Use of Chalkboard

Samples of layouts of chalkboard writing are shown below.

Sample A

23rd/June/06
Water and other liquids
Characteristics of water and other liquids.

Experiment
Title: Activity 2 Which liquid pours more easily?

Aim: To find out which liquid flows faster or more slowly.

Apparatus: Water, cooking oil, plastic bottles, ruler, marker, stopwatch, funnels.

Method:
Obtain two identical plastic bottles and place a funnel on each.
Mark each bottle equally.
Measure some water and pour it into one of the bottles through the funnel.
Time it and check how long it takes to reach the mark.
Repeat the activity with the cooking oil.
Copy and complete the table:

Observation:

Liquid	How long does it take to reach the mark?	Does it flow fast or slowly?
Water		
Cooking Oil		

Conclusion

Conclusion/ today's summary

Pure water is colourless, odourless and tasteless.
Cooking oil flows more slowly than water

Exercise

Divide the chalkboard into four sections, showing clear differences in sections of the experiment

Sample B

23rd/June/06
Water and other Liquids (-> Title)
2). Characteristics of water and other liquids

Activity 1: Comparing some liquids (-> Title of activity)

Materials: water, kerosene, orange juice, cooking oil, (transparent) bottles (-> Resources of the activity)

(-> Result of the activity)

Water and other liquids are different. They smell differently. Their

Liquid	Colour	Smell	Texture
Water	Colourless	No smell	Thin
Kerosene	Colourless	Has smell	Thin
Orange juice	Orange	Has smell	Thin
Cooking oil	Has colour	Has smell	Thick

colours are different. Their texture (feel) is different.
Some liquids flow more slowly than others.
Pure water is colourless, odourless and tasteless.

Activity 2: Which liquid pours more easily?
(->Title of activity)
Materials: Water, cooking oil, plastic bottles, ruler, marker, stopwatch, funnels.

Procedure:

Obtain two identical plastic bottles and place a funnel at the mouth of each.
Mark each bottle equally.
Measure some water and put into one of the bottles through the funnel.
Time how long it takes to reach the mark.
Repeat the activity with the cooking oil (palm oil).

Result:

Conclusion/ today's summary
Pure water is colourless, odourless and tasteless.
Cooking oil flows more slowly than water

Liquid	How long does it take to reach the mark	Does it flow faster or slowly?
Water Cooking Oil (Palm oil)		

Conclusion

Conclusion/today's summary

Pure water is colourless, odourless and tasteless.
Water flows faster than cooking oil (palm oil).

Exercise

5. English as a Teaching Tool

(a) The text in this lesson may be quite difficult for the pupils to read with understanding. If this is so, prepare a simplified version to write on the blackboard for the pupils to read and to copy into their exercise books. For example the first page can be re-written as follows:

> Water and other liquids are different. They smell differently. Their colours are different. Their texture (feel) is different. The activities in this lesson show how the liquids are different. You will need some different liquids – kerosene, palm oil and engine oil.

Write the name of each liquid in the first column.

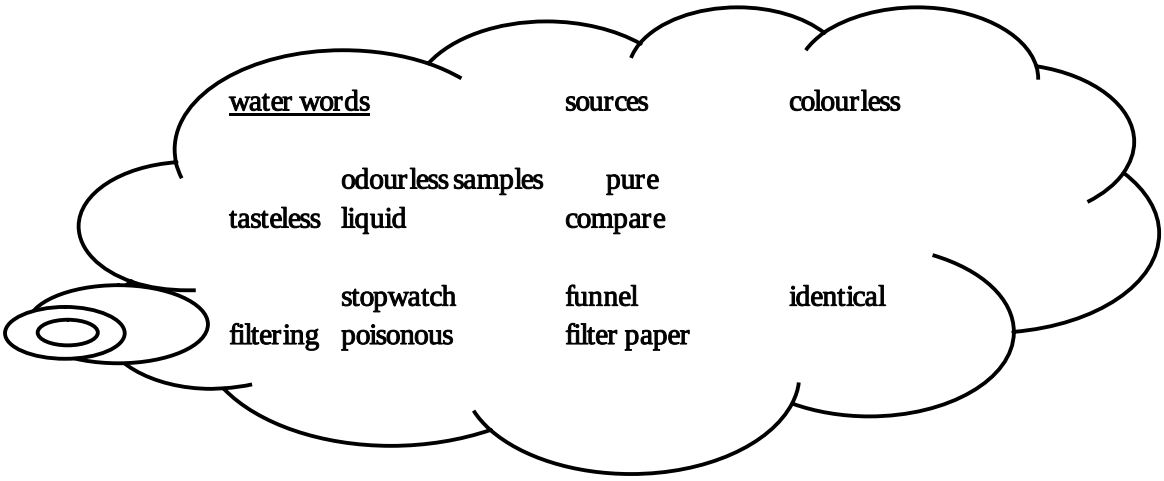
Make a class chart as shown:

Liquid	Does it have colour?	Does it have smell?	Does it have taste?	What is the texture? Is it thick or thin?

If the pupils' standard of English is good the teacher can introduce the new vocabulary linked to vocabulary the pupils have already learned. For example:

- odourless means no smell
- tasteless means no taste
- identical means the same

(b) A simple definition of the vocabulary "thick" and "thin" is given in the pupils' book as "thick liquids flow or fill more slowly than thin liquids". The teacher will have to discuss this concept with the pupils after they have observed the experiment because they will already be familiar with the use of this vocabulary in the context of thickness and thinness of a book or a slice of bread, for example.



Sample Lesson Plans (TYPE B)

Lesson 3: Rusting (Primary 6)

1. Lesson plan
2. English as a teaching tool

Lesson 4: Production of Sound (Primary 6)

1. Lesson plan
2. English as a teaching tool

Lesson 5: Properties of Air (Primary 4)

1. Lesson plan
2. English as a teaching tool

Lesson 3: Primary 6 Rusting (Characteristics of Metals and Non-metals)

1. Lesson Plan

SUBJECT: Science **REFERENCES**: 1. Primary School Integrated Science Syllabus pg 68-69
CLASS: Primary 6 **Details about the Class:** Some pupils have done woodwork and they are familiar with rusted nails and new nails

DAY/DATE/TIME/DURATION	TOPIC/ SUB-TOPIC	OBJECTIVES/R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
19/MAY/04 THURSDAY 8:00～ 30 MINUTES	**TOPIC:** KINDS OF METALS **SUB-TOPIC**: RUSTING	**OBJECTIVES:** By the end of the lesson, a pupil will be able to: 1. mention four examples of rusty objects in the environment, 2.describe the process of rusting by an experiment, 3.state at least two ways of preventing rusting.	**TLMs:** Iron nails, steel wool, water, oil, salt, lemon juice or vinegar, jars, rusty nails and rusty steel wool. **INTRODUCTION:** Let pupils tell the difference in the colour of new and old roofing sheets. **ACTIVITY:** – Pupils observe the clean nails and steel wool and then predict what will happen if these things are left in an open place for about one week. – Pupils examine the old nails and steel wool for any observable changes in colour and texture. Compare them to the clean ones. – Pupils give examples of other materials, which look like the old nails in the environment. – Pupils verify their predictions by finding out what makes iron and steel look old and brownish in colour by performing an experiment using the procedure below.	**CORE POINT 1:** New roofing sheets look silvery and old ones look reddish-brown. **CORE POINT 2:** The nails will change colour. The nails and steel wool will become dirty and old. The clean nails have their original colour and texture whilst the old nails and steel wool have changed to a brownish and their surfaces have become rough. Examples of objects are: old vehicles, spoons, some earrings, wires, iron rods coal pots etc	**ORAL QUESTIONS:** **1.** Mention 3 examples of metallic objects. **2.** What will happen if you leave clean nails outside the classroom for three days? **3.** State three differences between the rusty nails and the new ones.

Continued from the previous page.

<table>
<tr><th>DAY/DATE/TIME/
DURATION</th><th>TOPIC/
SUB-TOPIC</th><th>OBJECTIVES
/R.P.K</th><th>TEACHING/LEARNING MATERIALS
TEACHER/LEARNER ACTIVITIES</th><th>CORE POINTS</th><th>EVALUATION/
EXERCISE</th></tr>
<tr>
<td>Observation of the experiment after a week</td>
<td></td>
<td>R.P.K.:

Pupils have seen old roofing sheets that have changed colour to brown.</td>
<td>PROCEDURE:

1. Pour the same amount of cooled boiled water, oil, vinegar, salt solution and ordinary water into each of the five jars. Leave one jar dry.
2. Put some new iron nails and some new steel wool into all the six jars.
3. Leave the set up for about one week or more.
4. Observe the nails and the steel wool for one week and record any changes in colour.
5. Record your observations in a table like the one below.
<table>
<tr><td>Jar</td><td>Steel wool</td><td>Iron nail</td></tr>
<tr><td>Dry</td><td></td><td></td></tr>
<tr><td>Ordinary water</td><td></td><td></td></tr>
<tr><td>Vinegar/ lemon juice</td><td></td><td></td></tr>
<tr><td>Oil</td><td></td><td></td></tr>
<tr><td>Salt solution</td><td></td><td></td></tr>
<tr><td>Cooled boiled water</td><td></td><td></td></tr>
</table>
6. Leave the set-up of the experiment for further discussion after one week.

After a week:

– Pupils record the results of their observations in a table.
– Teacher and pupils discuss the process of rusting using the rusty nails and steel wool as examples.
– Teacher and pupils discuss two ways of preventing rusting.</td>
<td>CORE POINT 3:

Rusting is a chemical reaction. It occurs on surfaces of metals. It normally occurs when air and water act on a metal for example iron and wears it off to produce a reddish-brown coating known as rust.

Painting and oiling can prevent rusting.</td>
<td>List four examples of objects that are in similar condition like the rusty nails.</td>
</tr>
</table>

2. English as a Teaching Tool

(a) At the beginning of the lesson the pupils are asked to predict what will happen to nails and steel wool if they are left in the open. The pupils can work in groups (eg. of 4) to discuss their ideas. Each group can explain their prediction to the class. Then they observe the changes in some old nails and steel wool. The pupils may have difficulty explaining their ideas in English. It is important for the teacher to encourage them and give them confidence to try to use their own words. Some pupils will find it helpful to be prompted or to answer a question, which the teacher provides them with some clues. Also, if the teacher needs to correct the pupil she can do so by repeating the pupil's incorrect sentence in the correct form rather than discouraging the pupil by saying she is wrong. For example:

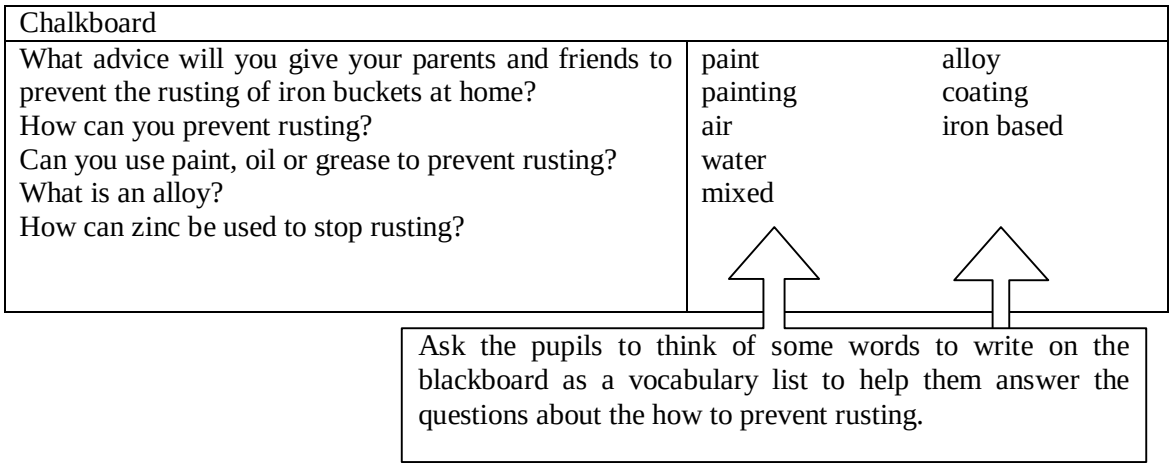
Ask the pupils to work in groups of 3-4 in which there is a child who is better in English is in each group.

Write some questions based on The Rusty Nail Experiment on the blackboard and ask each group to read out one question.

Chalkboard		
Activity 1 What is likely to happen to the nails? What is likely to happen to the steel wool? Activity 2 What did you observe? What happened to the nails? What happened to the steel wool? Have you seen any rusty metal in the village?	iron nails steel wool machinery roof	rusty red colour air water process

Ask the pupils to think of some words to write on the Chalkboard as a vocabulary list to help them answer the questions about the rusty nail experiment.

(b) You can use a similar method as above to help the pupils complete the tasks in the text book.



(c) The review questions provide a good opportunity for the teacher and pupils to revise and practise the English vocabulary they have learned. Pupils can complete the exercises orally and can write them in their exercise books.

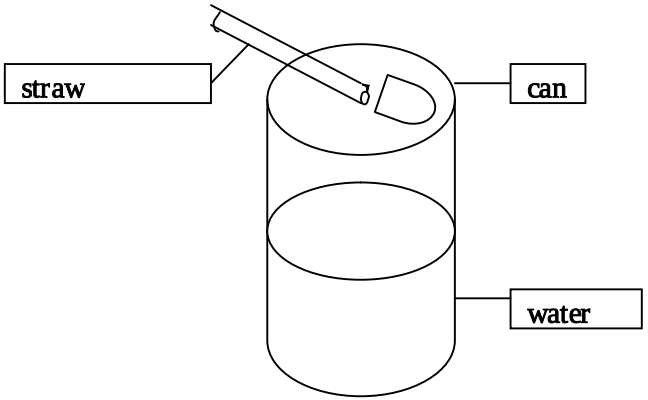
NOTE FOR TEACHERS: The methodology described for this topic can be modified to correspond with the concepts and vocabulary of many other Science lessons.

Lesson 4: Primary 6 Production of Sound (Energy)

1. Lesson Plan

SUBJECT: Integrated Science **REFERENCE**: 1. Primary School Integrated Science Syllabus pg 63
CLASS: Primary 6 **DETAILS ABOUT THE CLASS**: Although Primary 4 Science has already dealt with the fact that sound is produced when particles vibrate, not many pupils have a good understanding of that.

DAY/DATE/TIME /DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE (S)/ R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE REMARKS
Thursday 26TH OF AUG. 9:00 ~ 60 minutes	Section 5 Unit 6 **TOPIC:** Production of Sound **SUB-TOPIC:** Measurement of length	**OBJECTIVES:** By the end of the lesson, the pupil will be able to; - demonstrate how sound is produced by vibration, - identify materials that can vibrate, - compare the differences in sound produced such as, high pitched sound, low pitched sound, quality of sound, and noise.	**T.L.M.s:** empty bottles (etc soft drinks), drinking straws, metal spoons **INTRODUCTION**: "What kind of music do you like?" "Do you know how musical instruments produce/make sound?" "What we are going to learn about today is how sound is produced." **ACTIVITY 1:** Pupils place rulers at the edges of the tables and tap the free end. T) "Can you hear any sound from the rulers?" "What is making the sound? "How do you describe the movement of the ruler?"	**CORE POINT 1:** Rapid movement of an object back and forth is called vibration. Vibration makes sound.	Exe. 1.Use the following words to complete the sentences below: soft, loud, instrument, bottles, objects, water, different, vibrating objects. a) Different ( )make( )sounds. b) Some sounds are ( ) than ( ), others are ( ). d) Sound is produced by ( ).

DAY/DATE/TIME /DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE (S)/ R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE REMARKS
		R.P.K..: Sound is produced when particles of matter vibrate. The degree of sound depends on the strength with which the matter is caused to vibrate. (From Primary 4)	**ACTIVITY 2:** The use of bottle /can as musical instruments. Put different amounts of water in empty bottles/cans. **Part 1**: Hit each bottle/can with a metal spoon and listen carefully to the sound each bottle makes. **Part 2:** Put a straw near the mouth of the bottles or cans, blow some air into the can through the straw, and adjust the position of the straw so that it makes sound.  Amount of water in the bottle / Pitch of the sound made by hitting / Pitch of the sound made by blowing Large / High/Low / High/Low Small / High/Low / High/Low T)" Which bottle makes high pitched sound by hitting (blowing)?" Teacher tells pupils to fill in the table. **CLOSURE:** The teacher lists up the core points of the lesson on the board through a short Q and A.	**CORE POINT 2:** When the amounts of water in the bottles/cans are not the same, the pitch of the sound produced is different, too. The smaller the amount of water, the lower the pitch becomes. The larger the amount of water, the higher the pitch becomes.	3. How do you make high pitch sound using empty bottles and water?

2. English as a Teaching Tool

(a) This lesson gives the pupils the practical experience of hearing sounds of different kinds and learning how the sounds are made. After completing the sound experiments the teacher completes a table of the results on the blackboard. The teacher should follow the steps below to make best use of the blackboard as a teaching and learning resource. This will also help the pupils to understand how to complete a table of results.

1. Tell the pupils, 'we are going to make a table of the results of the experiment'.
2. Give the table a title: Production of Sound Experiment.
3. Draw the table and write the heading in the first column: Amount of water in the bottle.
4. Hold up the bottle that made the highest pitch sound and the bottle that made the lowest pitch sound. Ask the pupils to describe how much water was in the two different bottles.

   Write "more water" and "less water" in the first column.
5. Write the headings in the second and third columns, reminding the pupils that these were the different ways they made sound from the bottles.
6. Explain to the pupils that they are going to complete the other spaces in the table.
7. Point to the first empty space and ask the pupils to say which result we put there.
8. The answer is "The pitch of the sound made by hitting the bottle that contained more water."

Point to the first empty space and ask the pupils to say which result we put here.

Answer: The pitch of the sound made by hitting the bottle that has more water.

Production of Sound Experiment		
Amount of water in each bottle	**Pitch of the sound made by hitting the bottle**	**Pitch of the sound made by blowing**
More water	High /Low	High / Low
Less water	High / Low	High / Low

9. Ask the pupils to listen again to the sound made by each bottle and say whether the pitch of the sound made by hitting the bottle that has more water is high or low.
10. Repeat points 7 and 8 for each of the other spaces to complete the table.

Lesson 5: Primary 4 Properties of Air

1. Lesson Plan

SUBJECT: Integrated Science **REFERENCES**: 1. Primary School Integrated Science Syllabus pg 12
CLASS: Primary 4 **DETAILS ABOUT THE CLASS**: (Example) Almost all pupils have used coal pots for cooking and know how to make the fire hotter although many of them do not know the reasons.
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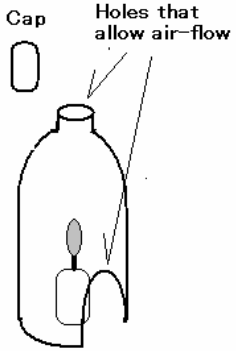
DAY/DATE/TIME/ DURATION	TOPIC/ SUB-TOPIC	R.P.K/ OBJECTIVES	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
THURSDAY 3rd of May 11:00 ～ 60 MINS	**TOPIC:** Air **SUB-TOPIC:** Properties of air	**OBJECTIVES:** By the end of the lesson, a pupil will be able to: Show how air supports burning. **R.P.K.:** Air is around us but cannot be seen. It occupies space and has weight. Air can hold things up. Air causes leaves on plants to move.	**TLMs:** A fan, a coal pot, charcoal, small and short candles, transparent covers (cut plastic bottles etc.) **INTRODUCTION:** The teacher starts the lesson with questions that relate the topic to real life. For example, "When you want to cook fast using a coal pot, what would you do to make the fire hotter?" **ACTIVITY 1:** The teacher shows a burning candle to the pupils. The teacher asks how they can keep the candle burning and also how they can stop it from burning. In order to present the fact that air supports burning, the teacher limits the flow of air for burning a candle by putting a transparent cover over a burning candle.  The teacher can ask the following questions: "What would happen to the candle when we cover it?", "Why did the burning candle go off?" **Safety:** This activity should be a teacher's demonstration, not pupils' hands-on activity. The plastic bottle can get dangerously hot and melt when the flame is too high or too close to the top of the bottle.	**CORE POINT 1:** Air supports burning.	**EXERCISE**: Fill in the gaps below with the right words. Q1. Air supports ( ).

Continued from the previous page.

DAY/DATE/TIME/DURATION	TOPIC/ SUB-TOPIC	R.P.K/ OBJECTIVES	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
	TOPIC: Air **SUB-TOPIC:** Properties of air	**OBJECTIVES:** By the end of the lesson, a pupil will be able to: Show how air supports burning. **R.P.K.:** Air is around us but cannot be seen. It occupies space and has weight. Air can hold things up. Air causes leaves on plants to move.	**ACTIVITY 2:** As shown in the figure below, the teacher puts a transparent cover with holes  After the pupils observe that the candle continues burning, the teacher can ask the following questions. Note: the questions and their sequence must be carefully organised so that the pupils can find out the core point for Activity 2 by themselves. Examples of questions are below. "What made the candle continue burning?" (Possible answers: air, holes, air-flow, etc…) "Why do we need holes to let the candle keep burning?" (Possible answers: getting air, air-flow, getting rid of air, etc…) **Alternatively,** before conducting the experiment, the teacher can ask the pupils what would happen to the burning candle, leading pupils to make an assumption or hypothesis. **ACTIVITIY 3:** The teacher demonstrates fanning a coal pot to make the fire hotter. This can be done outside the classroom, considering safety. The pupils should be encouraged to compare the results of Activities 2 and 3, focusing on the supply of air. **SUMMARY:** The teacher lists up the core points of the lesson on the board through a short Q and A. The teacher leads a discussion with the pupils with the aim of making them discover that the core points they learnt in the lesson are very relevant to their everyday life.	**CORE POINT 2:** Supply of air or air-flow is needed for continuous burning. Fanning fire increases the supply of air. Increased supply of air makes the fire brighter and stronger.	EXERCISE: Q2. Supply of ( ) is needed for a candle to keep burning. Q3. How would you make the flame of a coal pot stronger? Q4. Explain why fire is brighter/hotter when we fan a coal pot.

2. English as a Teaching Tool

(a) In the first part of this lesson the teacher may simplify the English language used by saying "air helps charcoal to burn" or "air helps the flame of the candle to burn". Later in the lesson the teacher should use the correct expression "air supports burning" so that the pupils become familiar with the standard expression which is used in the pupils' book.

Irregular Vocabulary — plural of "charcoal" is "charcoal"

E.g. Put some more charcoal in the charcoal pot.

Irregular spelling — fan - fanning stop - stopped

(b) During the part of the lesson when the teacher conducts the experiment she should encourage the pupils to use full sentence construction to explain their ideas and to use higher order thinking. For example:

Qu. Why did this candle continue burning but this candle stopped burning?

Ans. This candle continued to burn because it had air. So it had a fresh supply of oxygen. This candle stopped burning because there was no fresh air. The flame needs oxygen to continue burning"

(c) At the end of the lesson the teacher can help the pupils to review the concept and to practise their English at the same time by giving a simple exercise as in the pupils' book.

The exercise can be given: orally or

as a written exercise or

the exercise can be written first and then checked orally or

practised orally and then recorded in writing.

The multiple choice format helps the pupils by giving them the correct sentence structure and spelling.