APPENDIX - III

A note

Appendix-III contains materials which were used for the systematic exposure of the student teachers to two modeling treatments, namely - symbolic modeling and audio-modeling. The materials were originally developed in Marathi, the English rendering is presented for convenience. The documents are :

A) Model microlesson script for 'probing questions'.

B) Model microlesson script for 'convergent questions'.

C) Model microlesson script for 'divergent questions'.

D) 'Question what type' Read - A pamphlet.

The pamphlet questioning was distributed to all the student teachers for reading. Scripts in III-A, III-B, and III-C served as 'symbolic models' were presented to group-A of phase-II and phase-III. The lessons based on the above scripts were audiotaped and the tape was replayed for the student teachers of group-B of phase-II and phase-III. This exposure was done on a day previous to the actual microlessons were scheduled to be held to enable the teachers to plan their lessons for that day.

APPENDIX - IIIA

(Model Microlesson)

Probing Questioning — Script by - The investigator

Topic : Factors of production — Class - IX

Class : Good morning, Sir.

Teacher : Very good morning, class. How was your yesterday's visit to the cashewnut factory?

Abhay : It was successful.

T : What do you mean by successful?

Bina : We got all the information about the factory.

T : Chiman, what information did you collect?

C : I found out the names of the countries where the nuts are exported.

T : Please, name the countries.

C : Soviet Union, U.S.A. and U.K.

T : What else did you study?

A : I collected information about the number of employees of the factory. Besides the office staff, there are twenty workers on the payroll.

T : That is good ! Who pays them?

B : Ofcourse, the owner of the factory.

T : Who pays the owner?

A : I could not follow you.

T : Would you tell, Bina.

B : I do not think anybody must be paying to the owner.

T : Chiman, what do you think?

C : The owner said that he had a partner in this business.

T : What do you mean by having a 'partner', Abhay?

A : Both of them must have collected money for the factory.

T : That is correct. But do you understand the meaning of the word 'owner' which all of you are using very frequently?

B : Owner is one who owns the factory.

T : What does he own?

A : The building, the machinery, the truck.

T : That's fine. Did the owner tell you all these things?

C : We did not know about this. The truck in which the boxes were being loaded was not of the owner. I confirmed this by talking to the driver.

T : That is very good of you. This means the owner must have a lot money. What do we call this money?

A : What do you mean? Sir, money is money - this may be called expenditure.

T : You are correct to some extent. In order to produce cashewnuts the owner has to invest money in buying land, erecting the building, buying the machinery, etc. All these items require money. We call this as 'Capital'.

A : Without 'Capital' we can not do anything.

T : That is perfectly correct. What are the other things that are necessary?

C : Servants.

T : Those who work in a factory are called 'workers' and those who work in office may be called servants or officers. These are all persons who help to produce what will you call all these things?

A : These are different items.

T : Please, name them, Chiman.

C : Money, workers.

T : These are called 'factors' that are responsible for 'production'. You should list exhaustively all the factors of production. We will discuss them tomorrow.

APPENDIX - IIIB

(Model Microlesson)

Convergent Questioning

Script by - The investigator

Topic : Effects of Heat Class - IX

Teacher : Last time we were discussing the various effects of heat. What happens when we start heating a substance? Abhay.

Abhay : The temperature of the substance increases.

Bina : Sometimes substances expand.

Chiman : Sometimes substances undergo change.

T : All of you have given correct answers. Now I would like you to give me some examples from daily life. Could you, Bina?

B : The inflated cycle tyre bursts.

T : Chiman, what can you say about this?

C : It is not a daily phenomenon. Such bursts occur sometimes in summar only.

T : That's right! But how will you explain this?

A : If we inflat hard, the air inside the tube gets heated. It has not scope or space, you may say, to expand with the result the tyre bursts with a loud noise.

T : That's a fine answer. Any other example?

A : If we bring butter in an open container, during summer it melts. In winter we are required to heat the bottles containing Coconut oil, because we just cannot pour oil from the bottle.

T : To what category would you include this example, Bina?

B : This is obviously a change in state of the substance due to heat.

T : Can you cite any other example of this type? Chiman.

C : Ice melts if it is not preserved in sawdust.

T : Good! Now any more examples, Abhay?

A : Mornings are generally cool while afternoons are hot.

B : This is obvious. It is the effect of the heat from the Sun.

T : What about that cycle burst about which Chiman was rather critical?

C : I just said that cycle bursts are not daily phenomene.

T : Then you can give me a similar example from the daily occurence?

After a pause

T : Yes! Chiman can you answer my question?

C : It is not a daily occurance.

T : Does not matter, let us have it.

C : I have seen the blacksmiths heating an iron tyre before fixing it on a wooden wheel of the bullock cart. The red hot tyre is lifted by big tongs and is put up on the wheel and water is poured when it sets in position.

T : That is wonderful.

B : Sir, milk overflows when heated if we are not that attentive.

T : That is an example from daily occurence. But Chiman has given a good example of expansion. Explain this in your words, Abhaya.

A : The iron tyre expands when heated and fits in easily over the wooden wheel. Water cools it and then it fits tightly over the wheel.

T : How will you generalize?

A : Heat expands and cold contracts.

T : That is good! What about the other effects?

C : There is rise in temperature when substances are heated.

B : There is a change of state of the substance due to heat.

T : Tomorrow you collect atleast two new examples of each category that were not given today. Thank you.

APPENDIX - IIIC

(Model Microlesson)

Divergent Questioning

Script by - The investigator

Topic : The solvent and the solute Class - IX

Teacher : Good after noon, class.

A,B & C : Good after noon, Sir.

Teacher : We have studied the different effects of heat on different substances. What is the most common effect of heat?

Abhaya : Rise in the temperature of the substance.

T : That is right. Supposing we take some tap water in a beaker and start heating it. What will you observe?

Bina : Sure! The water will get heated.

Chiman : No, Sir, we will see some bubbles rising from the bottom of the beaker.

T : Was Bina wrong in answering my question?

C : Yes Sir, you asked about the observation. We can not observe the rise in temperature but we can see bubbles rising up.

T : That's like a scientist. Can anybody tell me, what are these bubbles due to?

C : They are air bubbles, sir.

T : Right. From where have they come?

A : Air must have been in the water itself.

T : How can it dissolve like that? Can anybody describe this phenomena?

C : What do you mean by 'describing the phenomena'?

T : You may think of an example.

A : Sugar desolves in water.

C : But then how can we explain this?

T : Where does that sugar go?

B : It must get broken to small particles.

T : How small?

C : It must get broken to such state that we are not able to see it.

T : How can you hypothesize this?

B : When a substance disolves it gets broken into very very small particles.

T : That way every substance is composed of small particles. There is no need to break the substance at all.

B : Why? Powdered sugar dissolves quickly than crystaline sugar. The whole solution tastes sweet.

C : Because of this sweetness we can infer that sugar must have been dissolved in water.

T : Your inference is correct. It is because of the particles we get the original water sweetened.

A : I think water particles and sugar particles move together.

T : Your guess is correct. But how will you describe the act or the process of 'dissolving'?

B : I feel that it must be accommodation.

T : What do you mean by this?

B : Water particles accommodate sugar particles.

C : It is just like pupils from one class are accommodated by pupils from another class.

A : It so happened during the film show. We had to seat four of us on one bench, while the bench is originally meant for two pupils only.

B : This became possible because the benches were a bit bigger in size. There was enough space in between the two boys when they are seated.

C : Now I can tell you, Sir, There is some space between two water particles. The sugar particle is just accommodated in between the space that is available to occupy.

T : Will you describe the phenomenon now? Bina.

B : When a substance dissolves in a liquid, the space between the particles of the liquid gets occupied by the particles of the substance.

T : That is good! But what about air in water?

A : Air particles occupied the space between water particles.

T : Let us stop here. We shall see something more about these solutions tomorrow.

APPENDIX - IIID

Phamphlet on Questioning

'Questions, What Type?' Read.

Script by : The Investigator

The objective of this pamphlet is to understand and appreciate questions and their importance in the teaching-learning process. You will be using a variety of questions in your classrooms. To be able to ask a right type of question at the right moment is an art in itself. Socrates was known for this 'art of questioning'. The Bhagawat Gita had emphasized and recommended questions to a seeker of knowledge. It is through questions that one raises one's doubts and gets them clarified. A teacher is regarded as a professional question asker. It is through questions the teacher delivers knowledge, develops appreciations and attitudes in his students. The competency of a teacher depends upon his ability to ask good questions. Let us study more about questions.

1. Qualities of a good question

A question seeks information from the person to whom it is addressed. Words are not only miticulously chosen but they are sequenced properly so as to enable the person to comprehend easily. Comprehension take some time to be developed. It is, therefore, necessary for a person to pause a little after his question in order to get an answer. In answering a question a person has tounderstand it first, then think of the possible answers, choose the correct one and then to say it. The questions which enable the above activities to be done smoothly may be called as good questions. The qualities of a good question are :

(a) Brivity : A lengthy question is difficult to comprehend. A short question reduces this difficulty. e.g. Name the city which is regarded as a capital of India? can be worded as 'what is the capital of India?

(b) Clarity : A question should be clear so that it is better understood. Properly worded questions may develop clarity. A question should not serve as a block towards understanding. For example, 'What is democracy?' Though this question is short, it is not clear.

(c) Though provoking : A good question serves as a trigger towards a chain of ideas and thinking process. Questions should raise the level of thinking in the children. Instead of telling the evil effect of war by the teacher, the teacher may "list some of the causes why wars are bad".

It will be seen that good questions help to achieve the instructional objectives and help to shape the behaviour and the thinking process of the children.

2. Strategies for effective questioning

How can a teacher be an effective question asker? How can he exploit fully the potential of questions? Even short exposures to formalized study of questioning techniques may help to raise the level of questions asked by the teacher. A few well-structured broad questions, used in conjunction with suitable pauses to allow thinking to take place can best achieve the purpose of asking questions. When a teacher asks a question he has an answer in mind. The student has to interpret the question, understand the implication and to frame an answer. All this process takes time. Rapid fire questions, therefore, prove to be less effective in evoking proper responses. Teachers asking as many as 150 questions in a 40 minute period are bound to fail getting correct answers. It is, therefore, desirable to ask fewer questions with appropriate pauses. As narrow questions prepare the base for broader questions, there should be a proper balance between the broad and narrow questions.

3. Classification of questions

(a) Questions are 'narrow' when there is one definite answer and which stimulate thinking of a lower order. Questions on cognitive memory may be basedupon learnt facts, principles, events, etc. which require simple recall or recognition 'What is UNO?; 'What is the Capital of Japan?' questions such as these are all narrow questions. The answer is definite as is often short. These questions help the teacher to know how far a student has learnt and how much of it he can remember. A majority of questions asked by most of the teachers happen to be narrow based on memory.

(b) Questions are 'broad' when they require no definite answers. There is no 'right' or 'wrong' answer. 'How can we communicate with persons who do not know our language?' is a board question which makes a student hink and then answer. It helps him to imagine, to think beyond his normal stock of knowledge. Such questions stimulate higher thought processes like, reflective thinking, reasoning, etc. Broad questions take the students beyond cognitive memory and develop in them application, synthesis, analysis, etc. As narrow questions expect very short answers, broad questions expect lengthy answers.

(c) Probing Questions : When a teacher asks a question and a student responds with a blank 'no', then the teacher has either to modify the question or redirect it to another student. The better way is to help the student to find out a correct answer. This can be done either by 'prompting' or 'refocusing'. This behaviour is known as probing behaviour. If the answer given by the student is partially correct then by 'seeking more clarification' the teacher may help the student to find out a correct answer. Probing, thus, consists of prompting, refocussing, and seeking more clarification from the student.

(d) Convergent Questions : Convergent questions, as the name suggests, are those which have a focus for thinking. They may be narrow in scope but they have a wider applicability. 'What are some of the states of India where rice is grown?' The pupils have studied the requirements for a rice crop to be grown and cultivated. This question help them to compare and contrast conditions like climate, rain, etc. so as todevelop a correct answer. To give similar examples, to compare and to contrast are some of the convergent behaviours having some focus for thinking. Questions based on convergent thinking are called convergent questions. Giving rational explanations, drawing logical conclusions are behaviours which are convergent in nature proving a definite focus for thinking.

(e) As against 'convergent thinking' there is a thinking process known as 'divergent thinking'. There is not single focus for thinking. Questions which stimulate 'divergent thinking' are called 'divergent questions'. 'How will you behave with a man from other plannet?' List some of the difficulties you will experience. There is no one right answer to this questions. The students have to imagine, reconstfuct their experiences, draw inferences and develop hypothesis and questions such as these are sometimes called higher order questions which may include analysis questions, synthesis questions, and evaluative questions. Bloom's Taxonomy and Guilford's structure of Intellect have been proved to be very useful in classifying questions.

You may try to use these types of questions while teaching in the classrooms and assess their effects on students' thinking and responses. Your queries will be answered either individually or during group discussions during general method periods.
