C H A P T E R V

DISCUSSION AND INTERPRETATION OF RESULTS

In chapter IV the data generated through the experiment were analysed. The present chapter is focussed on the discussion of the results and the interpretation of the same. In this experiment, the investigator had started with four patterns of teaching behaviour. The purpose of the experiment was to examine three hypotheses.

5.00 HYPOTHESES

The first hypothesis was formulated as under:

Hypothesis I: There will be no difference in the attainment scores for knowledge when the pupils are taught by either of the four patterns.

The hypothesis implied that the attainment of knowledge objective would remain the same irrespective of the four patterns of teaching behaviour. The hypothesis is the null hypothesis. The results as discussed in caption 4.50 in chapter IV do not support the null hypothesis. It has been found that pattern III comes out to be the most effective pattern of teaching behaviour as compared to other patterns as far as the knowledge objective is concerned. This is evident from the significantly higher

adjusted mean criterion score for P_3 than the adjusted mean scores for the other patterns. The null hypothesis is not supported. One of the patterns is found to be more effective than the other patterns.

The second hypothesis which the investigator aimed at examining was:

Hypothesis II: There will be relatively low attainment for comprehension and application objectives when the pupils are being taught through pattern I as compared to other three patterns.

This hypothesis implied that pattern I is not effective when the teacher aims at developing comprehension and application. Pattern I is only narration equivalent to teacher's lecturing to the students without their involvement. The rationale for the hypothesis already discussed elsewhere in this report is that when higher objectives of learning are aimed at only lecturing by teachers would not help. The results of the experiment have been discussed under caption 4.50. The results partially support the hypothesis. This implies that where comprehension objective is concerned pattern I is less effective than patterns II, III and IV. Pattern III is found to be the most effective in the case of comprehension as also for knowledge. When the mean adjusted criterion scores are studied in case of the application objective,

no significant difference is found across the four patterns. One cannot say on the basis of the present experiment which pattern is more effective and which pattern is less effective as far as the application objective is concerned.

The third hypothesis being examined in this study was as under:

Hypothesis III: There will be comparatively high attainment when the pupils are taught through pattern II.

This hypothesis is again not supported as is evident from the results given under caption 4.50. Pattern II does not yield any significant higher mean adjusted score in case of application objective. In fact, there is no pattern from amongst the four patterns selected in the present experiment which is associated with a higher attainment for the application objective.

5.10 DISCUSSION

The investigator aimed at probing into appropriate teaching behaviours that would contribute to a better attainment of the three major instructional objectives. The results of such a study would prove useful in developing a good teacher education programme. It is never presumed that a single isolated study of this type would provide results, the validity of which would be acceptable at all times with all teachers and in case of all subjects. A

review of studies by various researchers in the area of teaching behaviour ably compiled by Rosenshine (1971) does not contain any study which attempted to establish relationship between patterns of teaching behaviour and instructional objectives except that some studies used number concepts (Allen, 1969), understanding of science (Anderson and Walberg, 1968; Snider, 1966), reading skills (Aspy, 1969; Bidderman, 1964; Berkin, 1967), critical thinking appraisal (Cook, 1967; Yager, 1966), mathematical concepts (Guggenheim, 1961) and comprehension (Solomon et al., 1963). Even these studies have not selected a variety of teaching patterns and established relationship between them and the instructional objectives. In absence of such studies it is difficult to compare the results of the present study with studies by other researchers. However, if one takes a bird's eye view of the number of predictor and criterion variables selected by other researchers, one finds that the various measures of teaching behaviours as developed by Flanders (I/D, i/d, extended indirect, extended direct, etc. etc.) teachers' use of criticism, approved or disapproved statements, praise, teacher acceptance of pupils ideas etc. have been used as independent or predictor variables and pupil achievement and attitudes have been used as criterion variables in one way or the other. A perusal of research studies also indicates that teacher cognitive behaviours like clarity, exploration, types of

questions, etc. have been used to some extent as independent variables and the general trend is to undertake more and more studies with respect to teacher's cognitive behaviours. The criterion variables selected by most of the researchers uptil now had been mostly the global attainment or attitudes except in couple of cases where critical thinking appraisal (Cook, 1967; Yager, 1966) and comprehension in American History (Solomon et al., 1963) have been studied. The findings in all the studies when seen together appear contradictory to such an extent that even the robust prøgamatist Prof. Stephen M. Corey felt the results of Wisconsin studies heart breakingly disappointing (ACD, 1966). The investigator, however, feels that the contribution of all the studies undertaken after the Wisconsin studies (1961) have clearly shown that pupils' growth - attainment as well as attitudes is positively related to teacher classroom behaviour and that under certain circumstances a specific type of teacher behaviour contributes to better achievement (Flanders, 1960). Of all the questions, attainment is more specific rather than global and the need is to have an analytic view of pupils' attainment and find out the relationship of each component of attainment with teacher behaviour. The study by Solomon and others (1963) classified teacher-pupil questions under six categories. The finding was that interpretative and factual questions were significantly related to factual

gain (knowledge) and comprehension. This study related attainment in knowledge and comprehension to two types of questions, namely, factual and interpretative. The finding of the present study also brings out some relationship between attainment of knowledge and comprehension objectives and patterns of teacher behaviour. The finding in the present study is that pattern I, (narrow questions) is effective in the attainment of knowledge and comprehension objective. Solomon's factual questions and the present investigator's narrow questions are similar. Solomon's study does not give only the effect of factual questions on the attainment of comprehension objective. Whereas the present study indicates that it is the narrow questions unaccompanied by positive or corrective feedback that are more effective as far as comprehension is concerned. Factual questions have been found to have positive significant correlation with arithmetic concept (Soar, 1966; Spaulding, 1965). Miller (1966) studied higher level questions by teachers' accompanied by elaboration of pupils' responses. He actually tried out two different treatments, viz. a directive mode and a responsive mode by the teachers. The criterion variables were mastery of facts (Knowledge) and higher understanding which can be classified as comprehension as well as application. He did not find any significant treatment effects. One does not know, however, to what extent treatments of Miller (1966) are in any way comparable to any of the treatments developed by the

investigator in the present inquiry. The most outstanding result of the present study is the relationship it has been able to establish between a pattern of teacher behaviour, namely, narrow questions by teachers and attainment of knowledge and comprehension objectives. The second important finding is that the development of application among the pupils requires a teaching pattern which is definitely different from the one associated with knowledge and comprehension objectives. What that pattern is, the present investigation fails to reveal. If anything the present investigation can say about the application objective is that patterns P_1, P_2, P_3 and P_4 are not effective. For attaining application objective, here it is worth remembering what Smith (1971) says:

> Experimental studies in teachers' education involve a number of steps. The first step is to determine whether the teachers trained for specific performance criterion behaved differently in their classrooms from similar teachers who do not receive the training . But it is more important to determine whether the trained teachers engender greater cognitive or affective growth in their students as compared to the controls.----- Separate correlational----- studies can be conducted for the trained and the untrained samples. Such correlational studies are basically useful because many teaching behaviours considered to be important seldom appear in the natural repertoire of teachers. (Smith, 1971, p.65)

The important thing is to mentally develop a pattern of teacher behaviour which one has failed to see in the classroom. This will call forth a high level of

imagination and a great depth of potential penetration on the part of the researcher. This is necessary i.e. one has to find out a teacher behaviour which is the most effective as far as application is concerned.

5.11 Some Inferences

The inferences that can be drawn from the present study are:

1. Some participation of pupils in the classroom discourse is important than either no participation or comparatively more participation.
2. Narrow questions are more effective than open questions as far as the attainment for knowledge and comprehension objectives is concerned.
3. In the context of the present study, feedback by teachers does not appear to play an important role.

All the three inferences are being discussed one by one in the following captions:

Participation of Pupils

The first inference refers to a comparision between pupil participation vs. no participation. The first

pattern provides for a variable of no participation. The ineffectiveness of the first pattern renders a point in favour of pupil participation. The next question is how much of this participation? In the case of this study, this question is being answered with pattern II on one side and patterns III and IV on the other. Pattern II provides for open questions which involve more time of pupil talk as against narrow questions of patterns II and III. Here a limited amount of pupil participation (narrow questions, P_3) has been found to be comparatively more important.

If one goes back to pupil participation studies done in the past, one finds an inconsistency among the results of such researches (Furst, 1967; Sharp, 1966; Soar, 1966; Wright and Nuthall, 1970, on the one hand using observation system and Fortune, Gage and Shutes, 1966; Solomon, Bezdek and Rosenberg, 1964; and Torrance and Parent, 1966 on the other using ratings as the measures of amount of pupil participation). In the case of the studies using observation system the correlation for student talk on a pupil achievement ranged from -.07 to +.25 and all are non-significant results. In the case of rating studies, this range was from -.06 to +.24. Only in the study by Torrance and Parent (1966), the student variables of finding errors or defects in classmate's solutions and pupils suggesting new or improved ways of class working had a 't' ratio of -3.08 and -2.08 significant at .01 and .05 levels

respectively. However, Church (1971) also attempted to study the amount of pupil participation. He concluded, "From the results... it would appear that questions are very important in prompting pupil learning, while the participation studies suggest that actually answering those questions may not matter too much".

This comment of Church (1971) can be better understood when the types of questions are compared.

Narrow Questions vs. Open Questions

In this study, narrow questions have been proved to be more effective in the attainment of knowledge and comprehension objectives.

Here, the questions have been classified in two types, namely, narrow - highly specified, and open - less highly specified questions. Many other studies have been conducted with this bifurcation of questions.

Of the seven investigations in which questions were classified into two types, only three investigations reported significant results. In Kleinman's study (1964) the high achieving teachers asked more high level questions. In Spaulding's study (1965), they asked fewer open ended questions and in a study by Thompson and Bowers (1968), the highest achieving teachers mixed convergent and divergent questions. In a study by Church (1971) whose operational

definitions of 'closed' and 'open' questions are near to the operational definitions of this study, it was found that when questions are directed to similar pupils, the increase in the proportion of open questions result in a decrease in the proportion of pupil answers accepted by teachers. The lower proportion of correct answers does not result in less learning. He is of the opinion that these two types of questions might be having certain optimum levels and that they may differ according to the objectives of the teacher. Ken Francis (1971) argued that open questions are valuable in helping to raise the level of pupil thought. However, Church (1971) suggests, "when the objective is pupil understanding and retention, the virtues of the challenge posed by open questions are outweighed by the detrimental effects of their vagueness...." This suggestion of Church (1971) is validated by the findings of the present study when P_3 - narrow questions prove more effective in the realization of knowledge and comprehension objectives which is parallel to the retention and understanding of Church (1971).

Amount of Feedback

In terms of teacher reaction to pupil responses, a variation in the amount and nature of feedback has been created either by the total absence of any type of feedback or a well planned and restricted feedback. Pattern III provides for 'No comment' (pupils' answers followed

immediately by another question) while patterns II and III provide for a teachers' comment like 'good', repeating the answer, using it in her own talk or in case the answer is wrong giving corrective feedback. Here, it has been found that 'No comment' is more effective than a composite measure of all other types of feedback.

Many investigators have studied the effect of 'teacher use of pupil ideas', 'direct and indirect ratios' on pupil achievement and they have found a positive trend in favour of these types of feedback. However, Rosenshine (1971) is of the opinion that:

> Although a great deal has been written about the importance of teacher use of student ideas (cf. Flanders and Simon, 1960), the significance of the variable alone is not as strong as has been claimed..... The results for this variable are not as strong as those obtained for 'criticism or disapproval'. However, the results are quite consistent because the correlations were positive in seven of the eight studies. (Rosenshine, 1971, p.71)

Soar (1965) did not find loadings on a significant factor for the frequencies in column 3 and cell 3-3 which had very low or zero order correlations with the achievement measures. Here column 3 and cell 3-3 refer to category 3 of FIACS (see Appendix 1.1).

According to Smith (1971), it is possible to compare the relationships of different types of intensities of criticism to student achievement. In no study was there

a significant negative correlation between mild forms of criticism or control and student achievement. Such mild forms include telling a student that his answer was incorrect or providing academic directions. This definition of mild criticism is parallel to the variable of "corrective feedback" in this study.

Since the feedback as a whole did not render any significant results in the case of present study, it leads to the need of a researcher's answering questions as forwarded by Church (1971) after his attempts to study the amount of feedback.

> What is needed now are further studies to determine just what it is about the comments following pupil answers which is so important. Is it the feedback regarding correctness which plays the crucial role? Or is it the extra information provided by the discussion of wrong answers? Alternatively, if many of the pupils are evaluating their own answer, then it might be the extra redundancy provided by answer repetitions which is important? (Church, 1971, p. 25).

5.20 IMPLICATIONS OF THE PRESENT STUDY

The major implication of the present study is for those incharge of teacher education programmes. The programme of teacher education today is based more on the learning theories and laws of learning rather than on studies of teacher behaviour and theories of instruction. This is a major weakness in the programme of teacher

education today. The teacher education has to be reshaped on the basis of the findings of empirical research in the area of teaching behaviours in classrooms. The immediate implication of the present study is that teacher preparation should concentrate on developing skills for putting narrow specific questions amongst trainees. A word of caution is necessary here. This is the first study of its type in India and unless adequate research has been undertaken on the validation of teacher behaviour it will be rather early to disseminate these behaviours in teacher education programme. Any new innovation has to be based on research and not on faith. Only ideas which have been tested in the research crucible should be disseminated as innovations likely to result in improvement. Gone are the days when innovations based upon opinions received more attention than innovations based on research findings. The present study does establish the effectiveness of a pattern of teaching behaviour based on narrow pointed questions as far as the attainment for knowledge and comprehension objectives is concerned. But the study is the first of its type. The present study can be a pacesetter for a series of experiments in the area of teaching behaviour in the years to come. Institutions of teacher education would do well in undertaking studies in this area which require not large amount of money but a high level of imagination and deep thinking.

5.30 SUGGESTIONS FOR FURTHER STUDIES

This research has thrown out a number of problems demanding concentration by future researchers. No doubt, the present study has established the effectiveness of narrow questions over other three teaching patterns, it, however, remains to be established whether there are other patterns also which are equally effective if not more than the pattern III of this study in the domain of knowledge and comprehension attainment. Teaching is a dynamic process. As long as a live teacher is going to manage the instructional programme in the classroom, it has to be remembered that his teaching behaviour would be influenced by the behaviour of the pupils, size of the classroom, nature of the teaching unit and many other such factors. It is very necessary that different patterns of teaching behaviour other than the four included in this study are selected as treatment variables and their efficacy tested with respect to attainment of different instructional objectives.

The second suggestion for research is in the area of application objective. In India, since 1956, the development of application objective is being stressed. Hundreds of evaluation workshops organized all over the country, have discussed the importance of application and have constructed items to measure application. In very

few workshops learning experiences necessary for the achievement of application objective have been discussed. The present study is one of the very few studies available in the world and certainly the first of its type in India where efforts have been made to establish relationship between patterns of teaching behaviour and attainment of application objective. The success of the study lies in its failure to find out such a relationship. The four patterns have more or less the same effect on the attainment of application objective. Research studies have to be undertaken to identify teacher behaviour pattern or patterns associated with the effective attainment of this objective.

A third suggestion is the need for the replication of this study. If the results of this study are to be passed on to institutions of teacher preparation the validity of the study has to be established through replications. Any replication of the study will have to take careful notice of (a) selecting the patterns, and (b) preparing the criterion test. A criticism is directed against studies of this type as the hierarchical nature of the instructional objectives is not considered. Future studies will have to be careful in dealing with this criticism through the use of valid application items and more rigorous statistical procedures.

It is hoped that the present study will encourage,

stimulate and even provoke researchers to take up more and more studies in this area that has been challenging teacher education in the latter half of the twentieth century.