CHAPTER V

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CHAPTER V

ANALYSIS AND INTERPRETATION OF DATA

INTRODUCTION

In the previous chapter, the research design of the present study has been thoroughly discussed. As a result of the experiment, the data were obtained. From the view point of the objectives of the present study, the data were taken for analysis and interpretation.

In chapter I, the purpose of the present study has been explicitly given in the terms of objectives. These objectives were concerned with the development of self-instructional material and its effectiveness. The details about the development of self-instructional material were discussed in chapter III. The experiment was conducted to test its effectiveness which was described in chapter IV.

The present chapter deals with the analysis and interpretation of the data for realising the

remaining three objectives which were related to the effect of training of self-instructional material.

The chapter is, therefore, divided into three major sections according to the objectives stated in chapter I. The sections are as follows;

1. Section 1: Decision making behaviour and thought processes of teacher-trainees.
2. Section 2: Effect of training in questioning for feedback upon decision making.
3. Section 3: Effect of training in questioning for feedback upon general teaching competency and the related teaching skills.

5.1 SECTION 1: DECISION MAKING BEHAVIOUR AND THOUGHT PROCESSES OF TEACHER-TRAINEES

This section is related to the Objective No.2. It is reproduced below:

"TO INVESTIGATE THE DECISION MAKING BEHAVIOUR OF THE TEACHER TRAINEES."

In order to test the Objective No.2, the data from the pre-test were analyzed into four categories as follows:

Category 5.1.1 : Antecedent

Category 5.1.2 : Thinking process

Category 5.1.3 : Content

Category 5.1.4 : Instructional moves

The percentages of the means and standard deviations of pre-test of four major categories are given in the following Table No. 5.1.1.

TABLE NO.5.1.1

TABLE SHOWING MEANS AND STANDARD DEVIATIONS OF PRE-TEST

	Antecedent	Thinking process	Content	Instructional moves
M	23.49	28.16	23.09	25.25
SD	05.45	10.02	06.32	08.59

The Means Scores of the student-teachers thought processes related to the four categories differ from each other. In order to test whether one of the thought processes of student-teachers

is dominant than the other, Chi-square test was used against equal probability. Thus, hypothesis of equal probability was tested. The relevant information is given in Table No.5.1.2.

TABLE NO.5.1.2

TABLE SHOWING CHI-SQUARE OF MEANS

	Antecedent	Thinking process	Content	Instructional moves
FO	23.49	28.16	23.09	25.25
Fe	25.00	25.00	25.00	25.00
	00.04	00.28	00.07	00.00

X^2 = 00.39 for df 3 at 0.05 level 7.815

(The scores are in percentages)

OBSERVATION AND INTERPRETATION

The above Table indicates that the difference between the means of four categories is not significant.

FINDING:

1. The teacher-trainees were thinking equally of all the four categories.
2. The teacher-trainees gave equal weightage to all of the four categories.

Category 5.1.1 and 5.1.2 again were sub-divided into four sub-categories for further information about the teachers' thoughts and decisions.

The percentages of the sub-categories of antecedent category are given in the following table.

TABLE NO. 5.1.1.3

TABLE SHOWING THE MEANS AND STANDARD DEVIATIONS OF SUB-CATEGORIES OF THE CATEGORY

	1.1 Preactive	1.2 Internal factor	1.3 Learner	1.4 Material
M	22.50	03.58	71.17	02.67
SD	08.17	05.09	20.88	02.20

OBSERVATION AND INTERPRETATION

The above table shows that there is a variation among the score means. It indicates that the teachers' decisions and thought processes were intensively related with the learners' behaviour. It is quite evident that during the interaction, the decision and thinking processes associated with the learners' class-room behaviour were 71.17%. Teachers' thought processes about preactive were 22.5% and the least were their thinking about internal factors and materials.

The mean scores of the student-teachers' thought processes related to sub-categories of antecedent category differ from each other. In order to test, whether the sub-category of learner is dominant than the other, Chi-square test was used against equal probability. Thus, hypothesis of equal probability was tested. The relevant information is given in Table No. 5.1.1.4.

TABLE NO.5.1.1.4

TABLE SHOWING CHI-SQUARE OF THE MEANS OF PRE-TEST

	1.1 Preactive	1.2 Internal-factor	1.3 Learner	1.4 Material
M	22.50	03.58	71.17	02.67
	25.00	25.00	25.00	25.00
	00.16	17.51	83.43	19.06

X^2 = 120.16 for df 3 at 0.05 level 7.815

(The scores are in percentages)

OBSERVATION AND INTERPRETATION

The Chi-square is highly significant.

FINDING:

1. The Chi-square is indicating unequal weightages given to different sub-categories.
2. Student-teachers thought more of learners than of preactive behaviour, then internal factor and lastly the material.

The sub-categories of thinking processes and their percentages are given in Table No. 5.1.2.5.

TABLE NO. 5.1.2.5

TABLE SHOWING MEANS AND STANDARD DEVIATIONS OF THINKING PROCESS OF PRE-TEST

	2.1 Retrieval	2.2 Perception	2.3 Interpretation	2.4 Reflection
M	16.33	24.75	49.67	10.92
SD	05.65	10.64	25.18	05.31

OBSERVATION AND INTERPRETATION

From the above table, it is seen that nearly 50% of the teachers' thought processes are related to the interpretation of learners' behaviour. It indicates that while interacting, the teacher thinks and interpretes about students' class-room behaviour. Next to interpretation their thoughts were related to the perception, then retrieval and then reflection.

The mean scores of the student-teachers' thought processes related to sub-categories of thinking process differ from each other. In order to test, whether the sub-category of interpretation is dominant than the other, Chi-square test was used against equal probability. Thus,

the hypothesis of equal probability was tested. The information is given in Table No.5.1.2.6.

TABLE NO.5.1.2.6

TABLE SHOWING CHI-SQUARE OF THINKING PROCESS (SUB-CATEGORY)

	2.1 Retrieval	2.2 Perception	2.3 Interpretation	2.4 Reflection
M	16.33	24.75	49.67	10.92
	25.00	25.00	25.00	25.00
	2.67	00.00	23.37	07.38

X^2 = 33.42 for df 3 at 0.05 level 3.185

(The scores are in percentages)

OBSERVATION AND INTERPRETATION

The Chi-square is highly significant.

FINDING:

1. Interpretation was the main thought process. Perception, Retrieval and Reflection occurred in the descending order.

5.2 SECTION 2 : EFFECT OF TRAINING IN QUESTIONING FOR FEEDBACK UPON DECISION MAKING

This section deals with the Objective No.3

which is reproduced below:

"TO STUDY THE EFFECT OF TRAINING IN QUESTIONING FOR FEEDBACK ON DECISION MAKING OF TEACHER IN THE CLASS-ROOM INSTRUCTION".

This part is related to Hypothesis 1. It is reproduced below:

"THERE IS NO CHANGE IN DECISION MAKING OF STUDENT-TEACHER BEFORE AND AFTER RECEIVING TRAINING IN QUESTIONING FOR FEEDBACK".

To test Objection No.3, post-test was given on the line of pre-test, after the training in questioning for feedback.

For the analysis and interpretation of obtained scores, the section 2 is divided into three sub-sections. They are as follows:

(a) Section 5.2.1 : Four major categories.
(b) Section 5.2.2 : Sub-category of four major categories
(c) Section 5.2.3 : Sentences related to single, double, triple and all the four categories.

(a) Section 5.2.1:

The scores were categorized in four major categories which are presented in Table No.5.2.1.7.

TABLE NO.5.2.1.7

TABLE SHOWING MEANS AND STANDARD DEVIATIONS OF PRE-TEST AND POST-TEST OF FOUR MAJOR CATEGORIES

	1 Antecedent		2 Thinking Process		3 Content		4 Instructional moves	
Test	I	II	I	II	I	II	I	II
M	43.58	49.91	48.25	48.66	40.66	32.50	43.16	39.75
SD	16.16	14.27	12.04	14.44	18.59	14.88	12.28	12.86

(The scores are in percentages)

The difference between the means is quite evident in the table. This significance of the difference between the means is tested using ANOVA.

The summary table of ANOVA is given below:

TABLE NO. 5.2.1.8

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF ANTECEDENT.

Source of variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	240.66	240.66	0.90	NS
Among subjects	II	1867.5	169.77	0.64	NS
Interaction	II	2910.34	264.57		

Required F ratio for the df at 1/11 = 0.05 4.84, 0.01 9.65

for the df at 11/11 = 0.05 2.83, 0.01 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between test 1 and test 2 is not significant. Therefore, there is no significant change in decision making of the teacher-trainees in antecedent category due to training in questioning for feedback. Hence, hypothesis one is retained.

2. The F ratio for the difference among the subjects is not significant. Hence, the sample is homogeneous.

FINDING

1. Questioning for feedback is ineffective in bringing about significant changes in decision making behaviour with respect to antecedent.

The summary of ANOVA for thinking process is given in Table No.5.2.1.9.

TABLE NO.5.2.1.9

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF THINKING PROCESS

Source of variation	df	Sum of squares	Mean Square	F Ratio	Remark
Between tests	I	1.04	1.04	0.00	NS
Among Subjects	II	678.48	61.68	0.19	NS
Interaction	II	3538.46	323.49		

Required F ratio for the df at	1/11 =	0.05 4.84	0.01 9.65
	for the df at 11/11 =	2.83	4.98

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore,

there is no change in thinking process.

2. The F ratio for the difference among the subjects is not significant which indicates that the group is homogeneous.

FINDING

Training in Questioning for Feedback is not effective in bringing about significant changes in thinking processes of teacher-trainees.

The summary of ANOVA of pre-test and post-test of content is given below.

Table No.5.2.1.10

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF CONTENT

Source of variation	df	Sum of squares	Mean Square	F Ratio	Remark
Between tests	I	400.17	400.17	0.80	NS
Among subjects	II	1545.34	122.30	0.24	NS
Interaction	II	5454.33	495.84		

Required F ratio for the df at	1/11 =	0.05 4.84	0.01 9.65
for the df at	11/11 =	2.83	4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is no significant difference between content scores of pre-test and post-test.

2. The other two F ratios viz: among subjects F ratio and between group among subjects F ratio indicate that -

   (i) the practice differences, i.e. difference between pre-test and post-test content were insignificant than individual differences, i.e. individual differences among subjects, thereby indicating that the dominance of individual differences i.e. they are more dominant than training programme. Training is ineffective in taking decision towards content.

   (ii) Among subjects F ratio is not significant which indicates that the group was homogeneous without regard to trial.

FINDING

The training programme of questioning for feedback is ineffective in bringing about change

in decision making of teacher-trainees related to content.

The summary of ANOVA of pre-test and post-test of instructional moves follows in Table No. 5.2.1.11

TABLE NO.5.2.1.11

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF INSTRUCTIONAL MOVES

Source of variation	df	Sum of squares	Mean Square	F ratio	Remark
Between tests	I	70.04	70.04	0.47	NS
Among subjects	II	2155.46	195.95	1.3	NS
Interaction	II	1634.45	148.58		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant, indicating there is no significant gain in the instructional

moves of the teacher trainees.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate the following things:

   (i) Among subjects F ratio is not significant, which indicates that the group is homogeneous in nature.

   (ii) The practice differences, that is, difference between pre-test and post-test were insignificant which was greater than the individual differences (i.e.differences among subjects). Thereby it indicates no effect of training programme.

FINDING

Training in questioning for feedback is not effective in taking the interactive decisions for changing the course of instruction i.e.instructional moves. Therefore, the hypothesis one which is related to the Objection No.3 is retained. In short, training in Questioning for Feedback is not effective in bringing about changes in the four

major categories of thought processes.

(b) Section 5.2.2:

In order to probe in detail about the thought processes and decision making behaviour of the teacher-trainees, the four major categories were further divided into sub-categories. These sub-categories have been already discussed in chapter IV.

Category No.1, 'Antecedent' is classified into four sub-categories. Means and standard deviations of sub-categories have been given in the following table.

TABLE NO.5.2.2.12

TABLE SHOWING MEANS AND STANDARD DEVIATIONS OF PRE-TEST AND POST-TEST OF SUB-CATEGORIES OF ANTECEDENT

	1.1		1.2		1.3		1.4	
	Preactive		Internal factor		Learner		Material	
Test	I	II	I	II	I	II	I	II
M	10.17	11.92	3.20	1.58	33.83	36.33	0.83	0.25
SD	01.56	5.17	05.96	04.19	20.86	13.22	2.23	0.82

The difference between the means is quite evident in the given table. The significance of the difference between means of preactive thoughts is tested by using ANOVA. The summary table of ANOVA is given below.

TABLE NO. 5.2.2.13

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF PREACTIVE

Source of Variation	df	Sum of squares	Mean square	F ratio	Remark
Between tests	I	18.37	18.37	0.63	NS
Among subjects	II	0802.46	72.95	2.51	NS
Interaction	II	0319.76	29.06		

Required F ratio for the df at 1/11 = 0.05 0.01

4.84 9.65

for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is insignificant difference between

pre-test scores and post-test score of preactive thinking of teacher-trainees.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

   (i) Among subjects F ratio is not significant which indicates that the group was homogeneous in nature without regard to trial.

   (ii) The practice differences, i.e. difference between pre-test and post-test of preactive thinking and decisions of teacher-trainees were insignificant than individual differences, i.e. individual differences among subjects, thereby indicating that the individual differences were dominant than training programme. Hence, training is not effective in taking decisions towards preactive.

FINDING

The training programme is not much effective in changing thought processes and decisions of teacher-trainees related to preactive behaviour.

The summary of ANOVA of pre-test and post-test of internal factor is given in Table No.5.2.2.14.

TABLE NO. 5.2.2.14

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF INTERNAL FACTOR.

Source of Variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	16.67	16.67	0.48	NS
Among subjects	II	256.84	23.34	0.67	NS
Interaction	II	380.33	34.57		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is insignificant difference between pre-test and post-test scores of internal factors.

2. The other two F ratios viz: among subjects F ratio and between group among subjects F ratio

indicate that

(i) Among subjects F ratio is not significant which indicates that the group was homogeneous.

(ii) The practice differences, i.e. difference between pre-test and post-test of internal factor of teacher-trainees were not significant than individual difference, i.e. individual differences among subjects, thereby indicating that the individual differences were dominant than training programme. Hence, training does not help the teacher-trainees to take decisions towards internal factor.

FINDING

Training of questioning for feedback is not effective in changing the teacher-trainees' thought process related to internal factor.

The summary of ANOVA related to Learner category is given in the Table No.5.2.2.15.

TABLE NO. 5.2.2.15

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF LEARNER

Source of Variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	54.00	54.00	0.14	NS
Among subjects	II	3191.34	290.12	0.77	NS
Interaction	II	4232.05	375.64		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is no significant difference between pre-test score and post-test scores of thought processes and decision related to learners.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

(i) Among subjects F ratio is not significant which indicates that there is no significant difference between the individuals i.e. the group was homogeneous without regard to trials.

(ii) The practice differences, i.e. difference between pre-test and post-test of learner which was insignificant than individual difference, i.e. individual difference among subjects, thereby indicating that the individual differences were dominant than training programme. Hence, training in Questioning for Feedback does not mean that it is much effective towards the thought processes and decisions about learner's behaviour.

FINDING

The training programme of Questioning for Feedback is ineffective in bringing about the change in the thinking and decision making of teacher-trainees related to learners.

The summary of ANOVA of pre-test and post-test of 'Material category' is given in table No.5.2.2.16.

TABLE NO.5.2.2.16

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF MATERIAL

Source of Variation	df	Sum of Squares	Mean square	F Ratio	Remark
Between tests	I	2.04	2.04	0.61	NS
Among subjects	II	31.46	2.86	0.86	NS
Interaction	II	36.46	3.31		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is significant difference between pre-test and post-test scores

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that
   (i) Among subjects F ratio is not significant indicating that the group was homogeneous without regard to trials.

(ii) The practice differences, i.e. difference between pre-test and post-test of material were insignificant than individual differences, i.e. individual differences among subjects, thereby indicating that dominance of individual differences, i.e. they are more dominant than training programme. Training component is not effective to improve the teacher-trainees' behaviour towards material.

FINDING

Training in Questioning for Feedback is ineffective in changing the thought processes related to 'Material'.

The means and standard deviations of pre-test and post-test of sub-categories of thinking processes have been given in Table No. 5.2.2.17.

TABLE NO.5.2.2.17

TABLE SHOWING MEANS AND STANDARD DEVIATIONS OF PRE-TEST AND POST-TEST OF SUB-CATEGORIES OF THINKING PROCESS

	2.1 Retrieval		2.2 Perception		2.3 Interpretation		2.4 Reflection	
TEST	I	II	I	II	I	II	I	II
M	7.16	6.42	14.66	10.58	30.58	33.50	6.42	1.08
SD	5.09	4.77	10.65	04.98	25.18	15.92	5.31	2.63

OBSERVATION

The difference between the means is quite evident in the table. The significance of the difference between the means is tested using ANOVA.

The summary of ANOVA of pre-test and post-test of sub-category of thinking process is as follows:

TABLE NO.5.2.2.18

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF RETRIEVAL

Source of Variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	3.37	3.37	0.09	NS
Among subjects	II	271.46	24.67	0.70	NS
Interaction	II	385.13	35.01		

Required F ratio for the df at 1/11 = 0.05 0.01

4.84 9.65

for the df at 11/11 = 2.83 4.98

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is no significant difference between pre-test and post-test scores of thought processes and decisions related to retrieval.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

   (i) Among subjects F ratio is not significant which indicates that the group was homogeneous without regard to trials.

   (ii) The practice differences, i.e.difference between pre-test and post-test of retrieval, thinking processes of teacher-trainees were not significant than individual differences, i.e. individual differences among subjects, thereby indicating that individual differences were dominant than training programme. Therefore, effect of training is not found in teacher-trainees of thoughts and decisions about retrieval.

FINDING

The training in Questioning for Feedback has not made any changes in retrieval processes of teacher-trainees.

The summary of ANOVA pre-test and post-test of perception is given in the Table below.

TABLE NO. 5.2.2.19

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF PERCEPTION

Source of Variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	100.04	100.04	1.49	NS
Among subjects	II	921.13	83.73	1.25	NS
Interaction	II	734.46	0.76		

Required F ratio for the df at 1/11 = 0.05 0.01

4.84 9.65

for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test

and post-test is not significant. Therefore, there is no significant difference between pre-test and post-test scores in thinking and decision making behaviour of teacher-trainees.

2. The other 2 F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

   (i) Among subjects F ratio is not not significant which indicates that the group was homogeneous without regard to trials.

   (ii) The practice differences, i.e. difference between pre-test and post-test of perception scores of teacher-trainees' thought processes and decisions were not significant than individual differences, i.e. individual differences among subjects thereby indicating that training is not dominating over the individual differences.

FINDING

The training in Questioning for Feedback has not significantly affected the perception process of teacher-trainees.

The summary of ANOVA of pre-test and post-test of interpretation is presented in the following Table.

TABLE NO. 5.2.2.20

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF INTERPRETATION

Source of Variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	51.04	51.04	0.09	NS
Among subjects	II	4723.46	42.95	0.08	NS
Interaction	II	5888.46	535.31		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant.

Therefore, there is no significant difference between pre-test and post-test scores of interpretation.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

   (i) Among subjects F ratio is not significant. Hence, the group was homogeneous.

   (ii) The practice differences, i.e. difference between pre-test and post-test of interpretation scores of teacher-trainees was insignificant than individual differences, i.e. individual differences among subjects thereby indicating that dominance of individual differences, i.e. they are more dominant than training programme. Training component is not effective to improve the teacher-trainees' thoughts and decisions towards interpretation.

FINDING

Training in Questioning for Feedback has not changed the thought processes and decision of teacher-trainees related to interpretation category.

The summary of ANOVA of pre-test and post-test scores of reflection is given in Table No.5.2.2.21.

TABLE NO.5.2.2.21

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST OF REFLECTION

Source of variation	df	Sum of squares	Mean square	F ratio	Remark
Between tests	I	170.66	170.66	7.81	HS
Among subjects	II	180.5	16.5	0.75	NS
Interaction	II	240.34	21.84		

Required F ratio for the df at 1/11 = 0.05 0.01

4.84 9.65

for the df at 11/11 = 2.83 4.98

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is highly significant. Therefore, there is high significant difference between pre-test and post-test scores of reflective thinking and it is in favour of pre-test.

2. The other two F ratios, viz: among subjects F ratio and between group among subject F ratio are not significant. Therefore, the group was heterogeneous.

FINDING

Training in Questioning for Feedback reduces thought processes of reflection type. (The reflection thought statements of teacher-trainees are enclosed in Appendix IX.)

(c) Section 5.2.3:

Section 5.2.3 deals with the major category and sub-categories which occur in each statement of the teacher-trainees. These statements were categorized according to the numbers of the categories dealt in the statements of the teacher-trainees.

Summary of ANOVA of pre-test and post-test of single category statement is given in the Table below.

TABLE NO.5.2.3.22

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST STATEMENT OF SINGLE CATEGORY

Source of variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	54.00	54.00	0.33	NS
Among subjects	II	2022.50	183.86	1.14	NS
Interaction	II	1772.00	161.09		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is no significant difference between pre-test and post-test scores of single category.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

   (i) Among subjects F ratio is not significant. Hence, the group was homogeneous without regard to trials.

   (ii) The practice differences i.e. difference between pre-test and post-test of single category scores of thought processes was not significant than individual differences i.e. individual differences among subjects, thereby indicating that training has not been effective over the thoughts and decisions of teacher-trainees in the post-test.

FINDING

Training in Questioning for Feedback has not made any changes in favour of single category statements.

The summary of ANOVA of pre-test and post-test statement of double category is presented in Table No.5.3.3.23.

TABLE NO. 5.2.3.23

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST STATEMENT OF DOUBLE CATEGORY

Source of variation	df	Sum of squares	Mean Square	F Ratio	Remark
Between tests	I	05.04	05.04	0.06	NS
Among subjects	II	2179.46	198.13	2.64	NS
Interaction	II	826.46	74.95		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is not significant. Therefore, there is no significant difference between pre-test score and post-test scores related to double category statements of teacher-trainees.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects F ratio indicate that

(i) Among subjects F ratio is not significant. Hence, the group was homogeneous without regard to trials.

(ii) The practice differences i.e. difference between pre-test and post-test of double category scores of thought processes was not significant than individual differences, i.e. individual differences among subjects, thereby indicating that the training has not been effective over the thoughts and decisions of teacher-trainees in the post-test.

FINDING

Training has not made significant change in the double category statements of thought processes.

Summary of ANOVA of pre-test and post-test of triple category statement is given in the

Table below.

TABLE NO. 5.2.3.24

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST STATEMENT OF TRIPLE CATEGORY

Source of variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	18.45	18.45	0.23	NS
Among subjects	II	480.20	43.65	0.56	NS
Interaction	II	850.05	77.27		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is insignificant. Therefore, there is no significant difference between scores of pre-test and post-test of triple category in a statement of teacher-trainee's thoughts and decision.

2. The other two F ratios, viz: among subjects

F ratio and between group among subjects F ratio evince that

(i) Among subjects F ratio is not significant which indicates that the group was homogeneous.

(ii) The practice differences i.e. difference between pre-test and post-test of triple category was not significant than individual differences, i.e. individual differences among subjects. Thereby it is clear that individual differences were dominant than training programme. Hence, training does not create any difference in thinking processes of teacher-trainees before and after providing the training.

FINDING

The effect of training in Questioning for Feedback is not seen in the cases of triple category statements of thought processes.

Summary of ANOVA of pre-test and post-test of statements related to all four categories is

given in Table No. 5.2.3.25.

TABLE NO. 5.2.3.25

SUMMARY TABLE OF ANOVA OF PRE-TEST AND POST-TEST STATEMENT OF ALL FOUR CATEGORIES

Source of variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	110.00	110.00	2.20	NS
Among subjects	II	478.50	43.50	0.87	NS
Interaction	II	549.50	49.95		

Required F ratio for the df at 1/11 = 0.05 0.01
4.84 9.65
for the df at 11/11 = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between pre-test and post-test is insignificant. Therefore, there is significant difference between the pre-test and post-test score of of the statements related to all the four categories.

2. The other two F ratios, viz: among subjects F ratio and between group among subjects

F ratio indicate that

(i) Among subjects F ratio is not significant which indicates that the group was homogeneous without regard to trials.

(ii) The practice differences, i.e. difference between pre-test and post-test of all four categories was not significant than individual differences, that is, individual differences among subjects. Thereby it is quite clear that individual differences were dominant than training programme. Hence, training does not affect the thinking processes of teacher-trainees towards all four categories in a statement.

FINDING

There is no change in statements related to all the four categories after the training of Questioning for Feedback. Therefore, the training is not effective in bringing about changes in the complexity level of thought processes.

(d) Section 5.3

EFFECT OF TRAINING IN QUESTIONING FOR FEEDBACK UPON GENERAL TEACHING COMPETENCY AND RELATED TEACHING SKILL

This section is related to the Objective No.4. It is reproduced below:

"TO STUDY THE EFFECT OF TRAINING IN QUESTIONING FOR FEEDBACK UPON GENERAL TEACHING COMPETENCY AND RELATED TEACHING SKILLS".

This part is related to Hypotheses 2 and 3. They are reproduced below:

Hypothesis 2: "There is no change in general teaching competency before and after receiving training in Questioning for Feedback."

Hypothesis 3: "There is no change in the performance related to teaching skill before and after receiving training in Questioning for Feedback."

In order to test the Objective No.4, the data were obtained from the scores of pre-test and

post-test by using PASTE, after the training in Questioning for Feedback.

The means and standard deviations of general teaching competency of pre-test and post-test is presented in the following Table.

TABLE NO. 5.3.26

TABLE SHOWING MEANS AND STANDARD DEVIATIONS OF PRE-TEST AND POST-TEST OF G.T.C.

	Mean	Standard deviation
Pre-test	63.25	07.25
Post-test	71.16	06.87

Summary of ANOVA of pre-test and post-test of General Teaching Competency is shown in the

following Table.

TABLE NO.5.3.27

SUMMARY OF ANOVA OF PRE-TEST AND POST-TEST OF GENERAL TEACHING COMPETENCY

Source of variation	df	Sum of squares	Mean square	F Ratio	Remark
Between tests	I	376.04	376.04	6.95	HS
Among subjects	II	590.46	53.67	0.99	NS
Interaction	II	595.46	54.13		

Required F ratio for the df at I/II = 0.05 0.01
4.84 9.65
for the df at II/II = 2.83 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between the pre-test and post-test is highly significant. Therefore, there is high significant difference between the pre-test and post-test scores of General Teaching Competency.

2. The other two F ratios, viz: among subject F ratio and between group among subjects

F ratio are not significant. Hence, the group was heterogeneous.

FINDING

Training in Questioning for Feedback is effective in bringing about significant changes in General Teaching Competency. Therefore, the hypothesis No.2 which is related to Objective No.4 is rejected.

The means and standard deviations of the related teaching skills which are formative evaluation teaching skills have been given in the following table.

TABLE NO.5.3.28

SUMMARY OF ANOVA OF PRE-TEST AND POST-TEST OF FORMATIVE EVALUATION TEACHING SKILL

Source of variation	df	Sum of squares	Mean square	F ratio	Remark
Between tests	I	2.67	2.67	12.71	HS
Among subjects	II	2.84	0.25	1.19	NS
Interaction	II	2.33	0.21		

Required F ratio for the df at I/II = 0.05 = 4.84, 0.01 = 9.65

for the df at II/II = 2.83, 4.48

OBSERVATION AND INTERPRETATION

1. The F ratio for the difference between the pre-test and post-test is highly significant. Therefore, there is high significant difference between the pre-test and post-test scores of formative evaluation teaching skill.

2. The other two F ratios, viz: among subject F ratio and between group among subjects F ratio are not significant. Hence, the group was heterogeneous.

FINDING

Training in Questioning for Feedback is effective in bringing about significant change related to teaching skill, i.e. formative evaluation teaching skill. Therefore, the Hypothesis No.3 which is related to Objective No.4 is rejected. (The scores of Formative Evaluation teaching skill are enclosed in Appendix VIII.)

DISCUSSION OF RESULTS

All findings of the study so far presented are enlisted for the convenience of readers.

1. The teacher-trainees were thinking equally of all the four categories.

2. The teacher-trainees gave equal weightage of all the four categories.

3. Student-teachers thought more of learners than preactive behaviour, then internal factor and lastly the material.

4. Interpretation was the main thought process. Perception, retrieval and reflection occurred in the descending order.

5. Questioning for Feedback is ineffective in bringing about the significant changes in decision making behaviour with respect to antecedent.

6. Training in Questioning for Feedback is not effective in bringing about significant changes in thinking processes of teacher-trainees.

7. The training programme of Questioning for Feedback is ineffective in bringing about changes in decision making of teacher-trainees related content.

8. Training in Questioning for Feedback is not effective in taking the interactive decisions for changing the course of instruction i.e. instructional moves.

9. The training programme is not much effective in changing thought processes and decisions of teacher-trainees related to preactive behaviour.

10. Training in Questioning for Feedback is not effective in changing the teacher-trainees' thought process related to internal factor.

11. The training programme of Questioning for Feedback is ineffective in bringing about the changes in the thinking and decision making of teacher-trainees related to learners.

12. Training in Questioning for Feedback is ineffective in changing the thought processes related to material.

13. The training in Questioning for Feedback has not made any changes in retrieval processes of teacher-trainees.

14. The training in Questioning for Feedback has not significantly affected the perception process of teacher-trainees.

15. The training in Questioning for Feedback has not changed the thought processes and decisions of teacher-trainees related to interpretation category.

16. Training in Questioning for Feedback reduces thought processes of teacher-trainees related to reflection type.

17. Training in Questioning for Feedback has not made any changes in favour of single category statement.

18. Training has not made significant changes in the double category statements of thought processes.

19. The effect of training in Questioning for Feedback is not seen in the case of triple category statements of thought processes.

20. There is no change in statements related to all the four categories after the training of Questioning for Feedback. Therefore, the training is not effective in bringing about changes in the complexity level of thought processes.

21. Training in Questioning for Feedback is effective in bringing about significant changes in General Teaching Competency.

22. Training in Questioning for Feedback is effective in bringing about significant changes related to teaching skill, i.e. formative evaluation teaching skill.

CONCLUDING REMARKS

On the basis of the abovementioned findings, it can be concluded that the material developed is effective in developing skill of 'Questioning for Feedback'. Therefore, the training with self-instructional material plays crucial role in bringing about these changes.

The self-instructional material is quite effective in bringing about the significant changes in general teaching skill and the related teaching skill. Therefore, the training in 'Questioning for Feedback' is more effective in both.

Training in 'Questioning for Feedback' is effective in changing only reflective thinking. It reduced the reflective thinking of student-teachers. That means, student-teachers do not need to rethink about the earlier decisions

which further implies that the earlier decisions taken by them, were appropriate or correct. Thus, training in 'Questioning for Feedback' helps the student-teachers in taking appropriate decisions during instruction.

The above conclusion confirms the findings of earlier studies that the thought processes and decisions were related to the learners. These studies included the following from abroad.

Wodlinger (1988)
Fogarty, Wang and Creek (1982)
Morine and Vallance, (1975)
Semmel (1977)
Clark and Peterson (1981)
Marx and Peterson (1981)
Peterson and Clark (1978)

It is also found in the study that training with self-instructional material in content of microteaching is effective. The studies were from India:

Lalitha, M.S. (1977)
Joshi, S.M. (1977)
Shah, S.C. (1979)
Shah, C.B. and Passi, B.K. (1978)

and the studies from abroad:

Turney, C. et. el. (1973)

Borg, W.R. et.el. (1970)

Perrott, E. (1976)

Conard, R.J. (1978) and

Chewprecha, T. (1977)