

CHAPTER V :F A C T O R A N A L Y S I S

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5.1 INTRODUCTION

The preceding chapter was devoted to an analysis and interpretation of the data collected with reference to the hypotheses formulated in the study. Here, in this chapter is presented a factor analysis of the data obtained from the battery of tests used in the investigation in measuring the perceptions of the college teaching communities of Madras about Semester System, Institutional climate, Teacher Morale, Leadership Behaviour and Dogmatism for the purpose of determining the basic dimensions in the total perceptions visualised in the study.

5.2 COMPONENT VARIABLES

The variables (or sub-tests) subjected to the factor analysis are 25 in number and they are given in the following table which is self explanatory.

Table 5.1 : Component Variables of the Factor Analysis.

Sl. No.	Name of Tool	Name of Variable		Code No. of Variable
1	Semester System	(A) Concept	(D)	1
	Perception Description Questionnaire	Philosophy	(D)	2
		Curriculum	(D)	3
		Teaching	(D)	4
		Class strength	(D)	5

cont...

Table 5.1 (contd.)

Sl. No.	Name of Tool	Name of variable	Code No. of variable
		Evaluation (D)	6
		Learning (D)	7
		Organization (D)	8
		Plant & Equipment (D)	9
		(B) Concept (F)	10
		Philosophy (F)	11
		Curriculum (F)	12
		Teaching (F)	13
		Class strength (F)	14
		Evaluation (F)	15
		Learning (F)	16
		Organization (F)	17
		Plant & Equipment (F)	18
		(C) Problems	19
2	Questionnaire on Institutional Climate	(A) Open Climate Dimensions	20
		(B) Closed climate Dimensions	21
3	Questionnaire on Teacher Morale	Teacher Morale	22
4	Questionnaire on Principal's leadership Behaviour	(A) Initiating Structure	23
		(B) Consideration	24
5	Dogmatism Scale	Dogmatism	25

D = 'Desirable' perception ; F = 'Feasible' perception.

5.3 PROCEDURE

A computer programme was used for the extraction of orthogonal factors and their varimax rotation. For the factor analysis all the 500 observations from the total sample of the investigation was taken. As a preliminary step a 25x25 intercorrelation matrix of the variables (vide Table 5.1) was computed to find the factor - factor relationship. The correlation matrix is given in Table 5.2.

It could be seen from the correlation matrix that the coefficient of correlation ranges from $-.00$ to $.50$. In deciding the number of orthogonal factors to be extracted from the correlation matrix, the number of sub-tests associated with the lowest range in the matrix was taken, the latter limit, having been fixed arbitrarily. It could be seen from the correlation matrix that the coefficient of correlation between variables 1 and 9, 11 and 12, 13 and 16, and 20 and 25 is the lowest (i.e. $-.00$) which indicates that each of these variables is a relatively different 'thing' or type of behaviour and that 8 basic cluster of variables could be identified in the total observations made. Taking this as a clue, the number of orthogonal factors to be extracted was fixed as 8. The orthogonal factors thus extracted and their loadings on the variables are given in Table 5.3 in a 25x8

Table 5.2 : Intercorrelation Matrix of the Variables. (25 x 25) (N=500)

Name of Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25			
1. Concept (D)																												
2. Philosophy (D)	-.06																											
3. Curriculum (D)	.30	.10																										
4. Teaching (D)	-.01	.35	-.21																									
5. Class-Strength (D)	.25	-.10	.15	.20																								
6. Evaluation (D)	.16	.37	.09	.07	-.03																							
7. Learning (D)	-.08	.21	.15	.01	.50	.31																						
8. Organization (D)	.51	.03	.29	.09	.06	-.05	.19																					
9. Plant and Equipment (D)	-.00	-.10	-.12	.12	.25	-.11	-.11	.20																				
10. Concept (F)	.01	.03	.04	-.10	-.10	.10	.02	-.07	-.11																			
11. Philosophy (F)	-.06	.20	.25	-.08	-.02	.30	.25	-.02	-.04	-.05																		
12. Curriculum (F)	.09	-.05	.19	-.27	-.03	.03	.01	-.01	.14	.14	.12																	
13. Teaching (F)	-.23	-.10	-.24	-.05	-.11	.03	.14	-.22	.04	.40	.09	.12																
14. Class-strength (F)	.10	.26	.12	-.15	-.05	.22	.02	.23	-.07	.18	-.33	-.11	-.36															
15. Evaluation (F)	.05	.38	.23	.02	.23	.44	.15	-.25	.03	-.24	.01	.09	.14	-.05														
16. Learning (F)	.34	.29	-.08	-.04	.27	.26	.47	.15	.10	.15	-.04	.06	.00	.00	.26													
17. Organization (F)	-.06	.29	.12	.23	-.12	.21	.32	.06	.15	-.20	.09	-.26	-.21	.19	.24	-.22												
18. Plant and Equipment (F)	.04	.35	.12	.08	.03	.14	.19	.09	.05	-.05	.42	-.08	-.13	.04	.38	-.11	-.04											
19. Problems	-.14	-.14	.37	-.07	-.01	-.10	.35	.13	.09	.36	.05	.01	-.01	-.05	-.14	-.19	-.09	-.12										
20. Open Climate	.18	.26	-.11	.13	.24	.03	.02	.08	.45	.12	-.00	.05	.04	.21	-.55	.06	-.03	-.07	-.10									
21. Closed Climate	-.14	-.13	-.05	-.11	-.25	-.14	-.29	-.26	.05	.24	.11	.25	-.22	.25	-.21	-.13	-.15	.09	.19	-.16								
22. Teacher Morale	-.01	.06	-.08	.09	.01	.02	-.24	.05	.04	.19	.00	.18	.35	.19	.08	.00	.00	.06	-.19	.08	.09							
23. Initiating Structure	.10	.15	.13	.08	-.24	-.01	.29	.18	-.05	.14	.15	-.19	.33	-.10	.02	.17	.03	.05	.00	.00	.13	-.08						
24. Consideration	.23	.01	-.10	-.14	.17	.04	-.36	-.14	.07	.05	.24	-.10	.04	.33	.04	.21	.13	.03	-.40	.02	.20	.00	.00					
25. Dogmatism	-.03	.08	-.23	-.03	-.25	.12	.11	.17	-.11	-.24	.10	-.03	.14	.19	.36	.07	.17	.11	.47	-.00	.08	.08	-.12	.05				

D = 'Desirable' perception

F = 'Feasible' perception

Table 5.3 : Orthogonal Factor Loading Matrix.

Name of Variables	Factor Number								Communi- ties
	I	II	III	IV	V	VI	VII	VIII	
1. Concept (D)	1.00	.00	.00	.00	.00	.00	.00	.00	.01
2. Philosophy (D)	-.08	.11	.06	-.07	.02	.35	-.15	-.20	.21
3. Curriculum (D)	.31	.14	.31	-.07	.07	-.17	.28	.10	.31
4. Teaching (D)	-.01	.13	.03	-.15	-.10	.08	-.26	.05	.12
5. Class-strength (D)	.25	.97	.00	.00	-.00	.00	-.00	-.00	.99
6. Evaluation (D)	.18	-.03	-.00	-.17	.08	.39	-.07	-.12	.24
7. Learning (D)	-.08	.48	.18	-.15	.06	.55	.26	.06	.67
8. Organization (D)	.52	.12	.85	-.00	-.00	.00	.00	-.00	.99
9. Plant&Equipment(D)	-.00	.21	-.30	.93	-.00	.00	.00	-.00	.99
10. Concept (F)	.01	-.13	-.06	-.13	.98	.00	-.00	.00	.99
11. Philosophy (F)	-.06	-.03	.11	-.14	.01	.21	.21	.14	.15
12. Curriculum (F)	.10	-.05	.02	.15	.19	.08	.14	-.17	.13
13. Teaching (F)	-.23	-.15	-.26	.03	.40	.09	.02	.31	.40
14. Class-strength (F)	.10	-.09	.25	-.10	.22	.14	-.09	-.32	.27
15. Evaluation (F)	.06	.22	-.14	-.10	-.17	.14	.00	-.00	.13
16. Learning (F)	.35	.21	.20	.02	.19	.87	-.00	.00	.99
17. Organization (F)	-.06	-.08	.19	-.28	-.19	.01	-.01	.03	.16
18. Plant & Equipment(F)	.04	.03	.01	-.04	-.03	.02	-.05	.02	-.01
19. Problems	-.14	.04	.31	.06	-.34	-.04	.87	.00	.99
20. Open Climate	.18	.23	.09	.40	-.12	.23	-.11	.08	.34
21. Closed Climate	-.14	-.27	-.31	.01	.23	-.24	.18	-.15	.35
22. Teacher Morale	-.01	.01	-.02	.07	.18	-.09	-.42	.00	.22
23. Initiating Structure	.10	-.18	-.05	-.01	.15	.09	.17	.94	.99
24. Consideration	.23	.12	-.28	.13	.06	-.00	-.51	.01	.43
25. Dogmatism	-.03	-.23	.27	-.16	-.21	-.03	.32	-.03	.30
Per cent variance	14.48	12.35	12.90	13.58					
		13.28	10.78	12.76	9.88				

D = 'Desirable' perception
 F = 'Feasible' Perception

Table 5.4 : Varimax Rotated Factor Loading Matrix.

Name of Variables	Factor Number							
	I	II	III	IV	V	VI	VII	VIII
	(Factor Loading)							
1. Concept (D)	.91	.06	.37	.10	.03	.11	-.13	.01
2. Philosophy (D)	-.11	-.08	-.07	-.01	-.06	.41	-.03	-.09
3. Curriculum (D)	.19	.15	.45	-.07	.06	-.13	.24	.06
4. Teaching (D)	-.04	.08	.00	-.02	-.29	.08	-.16	-.01
5. Class-Strength (D)	.09	.90	.23	.20	-.11	-.12	-.15	-.14
6. Evaluation(D)	.15	.06	-.01	-.06	-.04	.45	-.04	.02
7. Learning (D)	-.19	.59	.09	.10	-.08	.41	.28	.16
8. Organization (D)	.18	.00	.93	.10	-.16	.18	.13	-.11
9. Plant & Equipment(D)	-.03	.07	-.19	.82	.40	-.25	-.20	-.08
10. Concept (F)	-.12	.04	.17	-.43	.64	.23	-.39	.38
11. Philosophy (F)	-.06	.06	.03	-.05	-.04	.15	.26	.20
12. Curriculum (F)	.05	-.01	.06	.06	.31	.14	.04	-.06
13. Teaching (F)	-.18	-.05	-.22	-.07	.25	.01	-.15	-.19
14. Class-strength (F)	-.02	-.06	.23	-.15	.12	.36	-.07	-.48
15. Evaluation (F)	.10	.25	-.14	.05	-.17	.06	.03	-.04
16. Learning (F)	.15	.33	.20	.30	-.01	.83	.03	.20
17. Organization (F)	-.05	-.08	.08	-.19	-.29	.06	.17	-.03
18. Plant & Equipment (F)	.03	.03	.02	-.00	-.08	.02	-.03	.00
19. Problems	-.08	.10	.13	.09	.13	-.20	.95	-.06
20. Open Climate	.06	.13	.12	.54	-.06	.09	-.08	-.01
21. Closed Climate	.00	-.17	-.26	-.25	.40	-.17	-.01	-.01
22. Teacher Morale	-.08	-.08	.03	.00	-.03	-.00	-.45	-.02
23. Initiating Structure	.14	-.07	.07	.01	-.14	-.15	.11	.95
24. Consideration	.19	.05	-.11	.16	-.09	.01	-.58	-.03
25. Dogmatism	.01	-.19	.13	-.14	-.07	-.00	.47	-.05

D = 'Desirable' perception

F = 'Feasible' perception

Note: 0.30 and above are taken as significant factor loading.

matrix. A factor was considered to be of less importance if its percent variance was less than 1. Applying this criterion, the 8 orthogonal factors were considered for varimax rotation. all The rotated factors and their loadings are given in Table 5.4 in a 25x8 matrix.

5.4 IDENTIFICATION OF FACTORS

The factors extracted by applying the factor analysis-method are discussed and named on the basis of the varimax rotated solution and are presented below factor-wise.

Varimax Factor 1 : Semester System Acceptance.

The significant factor loading on varimax Factor 1 is given in the following table.

Table 5.5 : Varimax Factor 1.

Sl. No.	Component variable	Varimax factor loading
1	'Concept' of Semester System - Perception of desirability	0.91
	Per cent common variance	14.47

The varimax Factor 1 is composed of only one variable, namely, the college teachers' perception of the desirability of the 'Concept' of a Semester System which has a factor

loading of 0.91 on the varimax factor. The percent common variance covered by the factor is 14.47 which is the highest for the varimax factors extracted in this study and hence this factor is the most important of them all.

The test items covering the variable measure the perceptions of the college teachers about the concept of structure, and organization of a Semester System. The high positive factor loading of the variable on the factor indicates that the college teaching communities accept Semester System as a desirable proposition, hence the factor is identified as "Semester System Acceptance".

Varimax Factor II : Teacher-Student Interaction.

The significant factor loading on varimax factor II are given in the following table.

Table 5.6 : Varimax Factor II.

Sl. No.	Component Variables	Varimax Factor loading
1.	'Class Strength' of Semester System - Perception of desirability.	0.90
2.	'Learning' of Semester System - Perception of desirability.	0.59
3.	'Learning' of Semester System - Perception of Feasibility.	0.33
Per cent common variance		13.28

The component variables of the factor are, the perceptions of college teachers about the desirability of 'Class strength', and 'learning' and the feasibility of 'learning' in a Semester System, the loading values of which respectively are 0.90, 0.59, and 0.33. The per cent common variance covered by the factor is 13.28.

The variables of the varimax factor have in common the college teachers' perceptions about the class-room learning situation that facilitates better teacher-student interaction conducive to effective learning. Hence the factor is identified as "Teacher-Student Interaction".

Varimax Factor III : Democratic Faculty Organization.

The significant factor loading on Varimax Factor III are given in the following table.

Table 5.7 : Varimax Factor III.

Sl. No.	Component Variables	Varimax Factor loading
1.	'Organization' of Semester System - Perception of desirability.	0.93
2.	'Curriculum' of Semester System - Perception of desirability.	0.45
3.	'Concept' of Semester System - Perception of desirability.	0.37
Per cent Common variance		12.35

The variable with high factor loading in Varimax Factor III is the perception of the college teachers about the desirability of 'organization', the loading value being 0.93. The other variables constituting the factor are the desirability of 'Curriculum', and the desirability of 'Concept' with the respective factor loadings of 0.45 and 0.37. The per cent common variance covered by this factor is 12.35.

The test-items of the variables constituting the factor highlight the organizational aspects of the departments of teaching, the curriculum, and the academic calendar characteristic of a Semester System. The dominant component of the factor here emphasises the democratic set-up of faculty organization which the teachers consider desirable, hence the factor is identified as "Democratic Faculty Organization".

Varimax Factor IV : Plant and Equipment Organization.

The significant factor loadings on varimax factor IV are given in the following table.

Table 5.8 : Varimax Factor IV.

Sl. No.	Component variables	Varimax Factor loading
1.	'Plant and Equipment' of Semester System perception of desirability.	0.82
2.	Institutional Climate - Open type.	0.54
3.	'Concept' of Semester System - Perception of feasibility.	-0.43
4.	'Learning' of Semester system - perceptions of feasibility.	0.30
Percent common variance		10.78

The variable, namely, college teachers' perception of the desirability of 'plant and equipment' is the highest loading component of Varimax Factor IV. The other variables of the factor are "institutional climate (open)," feasibility of 'concept', and feasibility of 'learning'. The loading values of the four variables are respectively 0.82, 0.54, -0.43 and 0.30. The per cent common variance covered by this factor is 10.78.

The variables 'plant and equipment', 'concept' and 'learning' of the factor suggest that the 'college teachers' desire adequate provision of plant and equipment in their institutions for making student learning feasible. The variable, open "institutional climate" of the factor indicates that the teachers perceive an 'open climate' in their institutions

as a condition necessary for the effective organization of the plant and equipment facilities for instructional and learning purposes. Hence the factor is identified as "Plant and Equipment Organization".

Varimax Factor V : Operational Climate Problems.

The significant factor loadings on varimax Factor V are given in the following table.

Table 5.9 : Varimax Factor V.

Sl. No.	Component variables	Varimax Factor loading
1.	'Concept' of Semester System - Perception of Feasibility.	0.64
2.	Institutional Climate - Closed type.	0.40
Per cent common variance		12.90

Varimax Factor V is characterized by significant loading by two variables namely feasibility of 'concept' and 'Institutional Climate (closed type)' with the respective loading values of 0.64 and 0.40. The per cent common variance covered by the factor is 12.90.

In component variables, 'concept' of the feasibility of Semester System, and closed institutional climate, of the varimax factor indicate that in the perceptions of the college

teachers, the working of the Semester System and 'Closed Climate' conditions appear linked. In an institution, closed climate' conditions engender operational and task-achievement problems. The variables of the factor have in common the operational aspects of a system, both administrative and social. Hence the factor is identified as 'Operational Climate Problems'.

Varimax Factor VI : Sound Learning.

The significant factor loadings on varimax factor VI are given in the following table.

Table 5.10 : Varimax Factor VI.

Sl. No.	Component Variables	Varimax Factor loading
1.	'Learning' of Semester System - Perception of Feasibility.	0.83
2.	'Evaluation' of Semester System - Perception of Desirability.	0.45
3.	'Learning' of Semester System - Perception of Desirability.	0.41
4.	'Philosophy' of Semester System - Perception of Desirability.	0.41
5.	'Class Strength' of Semester System - Perception of Feasibility.	0.36
Per cent common variance		12.76

On Varimax Factor VI, five variables are found to show

significant loading. They are in the descending order, feasibility of 'learning', desirability of 'evaluation', desirability of 'learning', desirability of 'philosophy', and feasibility of 'class-strength' with the respective loading values of 0.83, 0.45, 0.41, 0.41, and 0.36. The per cent common variance covered by the factor is 12.76.

All the five variables have in common the learning process that takes place in a Semester System, the salient features of which are, systematic study and evaluation, periodic feed-back, provision for selecting courses according to one's needs and interest, adopting one's own pace of work, and small classes facilitating better teacher guidance in learning. The factor is hence identified as 'Sound Learning'.

Varimax Factor VII : Interpersonal Problems.

The variables loading significantly on varimax factor VII are given in the following table.

Table 5.11 : Varimax Factor VII.

Sl. No.	Component Variables	Varimax Factor loading
1.	Problems of Semester System	0.95
2.	Principal's Leadership behaviour - 'Consideration' dimension	-0.58
3.	Dogmatism	0.47
4.	Teacher Morale	-0.45
	Percent common variance	13.58

Varimax Factor VII is characterised by significant loading in four variables which in the descending order are "Problems of Semester System", 'Consideration' dimension of Leadership Behaviour, 'Dogmatism' and 'Teacher Morale' which have the loading values of 0.95, -0.58, 0.47, and -0.45 respectively. The per cent common variance covered by the factor is 13.58.

The dominant variable of the factor is 'problems of Semester System'. The other variables concern dimensions of interpersonal relationship in an institution. The characteristics of the factor indicate that the college teachers perceive situations of low morale and dogmatism among teachers, and lack of consideration in the leadership behaviour of principals which might cause problems, interpersonal in nature, detrimental to the adoption of the Semester System in their colleges. The factor is hence identified as "Interpersonal Problems".

Varimax Factor VIII : Initiating Structure Expectancy.

The significant factor loadings on varimax factor VIII are given in the following table.

Table 5.12 : Varimax Factor VIII.

Sl. No.	Component Variables	Varimax Factor Loading
1.	Principal's Leadership Behaviour - "Initiating Structure" dimension.	0.95
2.	"Class-Strength" of Semester System - Perception of Feasibility.	0.48
Per cent common variance		9.68

Varimax Factor VIII is characterised by very significant loading by the 'Initiating Structure' dimension of Leadership Behaviour (0.95). The other variable showing significant loading on the factor is the feasibility of "Class-Strength" (0.48). The per cent common variance covered by the factor is 9.68.

The characteristics of the factor suggest that the teachers expect the Principals or Heads of Institutions to provide leadership and take initiative in the matter of establishing well defined patterns of organization, channels of communication, and methods of procedure, and more particularly small classes for the effective functioning of the Semester System. The factor is therefore, identified as 'Initiating Structure Expectancy'.

5.5 CONCLUSION

The factor analysis of the responses of the college teachers on the variables of the study as stated in the chapter brought out 8 basic dimensions in the perceptions of the teachers about the Semester System. They are listed below in the order of their importance as judged from their per cent common variance.

1. Semester System acceptance
2. Interpersonal problems
3. Teacher-student interaction
4. Operational Climate problems
5. Sound learning
6. Democratic faculty organization
7. Plant and Equipment organization
8. Initiating Structure expectancy.