CHAPTER - IV

FACTORIAL STRUCTURE OF TEACHING COMPETENCIES

4.0.0 Introduction

In the preceding chapter, the two approaches adopted to achieve the objective of the study were mentioned. This chapter reports the results related to the first approach. More specifically, the following two questions have been answered in this chapter:

(i) What is the factorial structure of desirable teaching competencies of physics teachers of Standard IX?

(ii) What are those specific teacher behaviours which describe each of these competencies?

In order to answer these questions, the presage, the process and the product variables were measured and factor analysed, and sets of teacher behaviours desirable for a competent physics teacher were arrived at. These sets have been named on the basis of the behaviours specified under each of them. These constitute the teaching competencies of physics teachers of Standard IX.

In the following paragraphs, the details of the statistical techniques employed, the correlation matrix

and the interpretation of the results are discussed. A summary of the results is provided at the end of the chapter. The mean and SD of the 117 variables involved in the factor analysis are provided in Appendix L.

4.1.0 The Statistical Techniques Employed

In order to identify the factorial structure of teaching competencies, the different presage, process and product variables were measured and factor analysed. The details of these variables are as follows: (i) presage variables - teacher's intelligence, teacher's attitude towards and interest in teaching, teacher's self perception about his teaching; (ii) process variable - teacher classroom behaviour; and (iii) product variable - students' liking for their teacher. In all, 117 variables were included in factor analysis.

The principal component analysis as reported by Cooley and Lohnes (1962) and Mulaik (1972) was employed for factor analysing the correlation matrix (117 x 117). After extracting fourteen factors, the process of extraction was stopped. This was done on the basis of the approach suggested by Harman (1967). A decision was made beforehand that if after seventy percent of the total variance is accounted for, any additional factor accounts for less than two percent(2%), it would not be retained. This arbitrary decision was made because it was thought that any factor having such small impact on the total variance could hardly have any practical significance.

Since the principal component analysis overemphasised the first factor (it accounts for 21.73 percent of the total variance) and the rest of the factors were subdued, it led to the formation of secondary factors to which psychological meaning could not be attached. Therefore, it was decided to go in for rotation of the factors. Rotation, according to Harman (1967), transforms 'arbitrary' factor matrices into 'meaningful' factor matrices satisfying the simple structure principles. Further, it was decided to do the rotation by the varimax method proposed by Kaiser (1956). This procedure not only approximates the classical simple structure principles, but it also tends to lead to factorially invariant solutions. Therefore, it seems to be the 'best' parsimonions analytical solution in the sense that it correlates best with the intuitive concept of that term as exemplified by the graphical solution (Harman, 1967).

Thus, the rotated factor matrix (117 x 14) with the fourteen factors and their loadings was ultimately arrived at for purposes of meaningful interpretation.

4.2.0 The Correlation Matrix

The coefficients of correlation between the different presage, process and product variables were worked out by the method of Pearson's product moment correlation. These have been provided in Table 4.1 in the form of a matrix (117 x 117).

It is evident from the matrix that majority of the coefficients are positive. The percentage of negative

TABLE 4.1

CORRELATION MATRIX (117 x 117), N = 130

Decimals are omitted.

Negative coeffcients are underlined.

coefficients in the entire matrix is approximately nine (9%). The values of coefficients range from -0.001 to + 0.977. This indicates that there are many positive inter-correlations between the variables and this overlap with respect to the content of the variables led the investigator to further go in for factor analysis.

When the nature of correlation between and within each of the presage, process and product variables is considered, it is clear that approximately nineteen percent (19%) of the coefficients is negative with respect to presage-process variables; six percent (6%) with respect to process-product variables; and thirteen percent (13%) with respect to presage-product variables.

As regards the range of coefficients, it is from -0.001 to + 0.327 in relation to presage-process variables; from -0.003 to + 0.445 in relation to process-product variables; and from -0.005 to + 0.249. in relation to presage-product variables.

4.3.0 Interpretation of the Results

The fourteen factors and their loadings (117 x 14) based on the original correlation matrix (117 x 117) have been presented in Table 4.2. These factors extracted through the method of principal component analysis have not been discussed. The reason for this is, as it has been mentioned

TABLE 4.2

PRINCIPAL COMPONENT FACTOR MATRIX

Sr. No.	Variable Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	INT	250	063	- 259	142	026	- 074	012	- 178	331	- 223	- 010	307	171	- 100
2	TAS	280	176	061	476	304	- 145	045	- 131	030	- 114	- 133	-031	- 054	- 077
3	IIT	209	108	096	505	222	- 148	095	- 230	-045	- 134	- 040	095	- 035	- 146
4	TINT	- 006	- 007	104	512	180	- 159	-018	- 120	-170	062	051	-137	233	- 203
5	TQN	240	058	160	604	210	032	138	- 066	-035	- 023	139	-003	108	- 114
6	TPQ	089	148	-007	530	225	001	-119	- 159	164	063	-107	075	028	- 217
7	TEXP	111	119	170	586	162	043	107	-043	015	150	029	-040	054	033
8	TSV	167	073	056	598	117	135	024	-031	096	014	113	-069	163	- 112
9	TPAC	121	079	099	392	078	126	040	033	204	-206	288	134	-077	051
10	TAVA	238	120	160	670	225	056	070	091	-134	-036	060	-019	082	091
11	TIME	277	060	101	648	211	139	-105	071	-100	-100	035	-002	-025	135
12	TBB	258	140	028	466	341	150	-114	196	030	-222	-010	191	021	059
13	TRE	200	104	049	463	204	-040	255	-193	-194	-117	074	026	004	023
14	TAC	188	039	-043	487	291	218	-201	140	-043	-146	-245	087	-132	180
15	TRAB	068	061	-041	536	225	089	-048	111	-057	-123	-063	054	122	354
16	TCRM	279	089	157	594	310	082	-067	-020	-020	010	034	101	-140	-039
17	TASS	110	143	206	589	308	044	-043	090	-130	086	-075	083	-034	005
18	PKG	578	-150	-151	-021	170	-126	-143	385	-057	149	-210	165	-015	-113
19	APD	523	-049	-279	-013	246	-168	-237	365	- 179	063	-195	207	-050	-065
20	CON	556	-142	-333	-038	247	-052	-229	318	-106	037	-168	235	-072	-217
21	REL	535	-190	-338	-094	178	-022	-241	305	-086	-024	-185	281	-091	-198
22	GCH	732	-151	-072	031	010	-249	-074	-110	029	046	-055	-088	164	-016
23	CONQ	604	-112	-168	-093	-002	-375	-043	-093	147	-078	032	-023	206	-183
24	RELQ	688	-213	-084	-007	097	-254	028	-009	035	-101	-093	042	137	-198
25	SPEQ	714	-237	-014	001	033	-284	-118	-069	006	-103	-047	-027	154	-081
26	PAVQ	548	-035	044	-119	-043	-400	010	-001	-335	-068	009	-119	019	355
27	RFPQ	459	-113	-031	080	-012	-354	-051	-128	074	-207	-068	-128	130	227
28	REPA	515	-278	-108	106	-048	-282	131	-156	-175	-113	018	034	-007	276
29	SUFQ	671	-043	-100	-096	078	-294	-111	035	-249	148	-122	003	169	045
30	PROQ	625	046	-225	-059	-071	-147	-035	022	-094	-031	-167	037	140	206
31	SFIQ	564	-015	-099	-088	-022	-154	-369	030	-162	028	-153	-063	171	072
32	REFQ	267	230	-064	094	-158	-243	-185	037	-178	-177	-075	-194	147	142
33	ICAQ	647	007	-075	-078	015	-197	-146	-068	-070	016	-242	-151	061	149
34	LINE	671	046	-276	007	-057	-073	-011	-135	175	041	115	158	-220	030
35	BCSE	528	128	-201	-042	017	010	-098	-064	155	-073	170	167	-313	111
36	RELE	489	-155	-352	-007	-053	-113	-138	-153	319	-346	-115	-113	-241	-032
37	CONE	502	-157	-356	-020	-061	-097	-113	-202	292	-293	-069	-084	-277	092
38	VOCE	628	-224	-250	053	039	-094	-074	-091	274	-160	-015	067	-196	098
39	FIUE	655	-094	-201	043	-135	-043	-104	-121	182	009	143	213	-363	147
40	VAGE	513	-309	-271	048	-048	-116	-023	-032	296	-111	-054	049	-255	079
41	PAUS	412	060	022	116	-033	-349	080	114	-227	-146	046	-110	-176	318
42	PACS	669	-022	-189	022	111	-201	213	-042	047	071	093	019	120	036
43	BEMT	659	-110	-210	-014	007	-223	136	-064	064	280	092	100	-029	040
44	HAMT	642	-159	-301	030	098	-091	-013	-122	222	141	057	082	005	-081
45	BOMT	569	-131	076	-094	104	-122	194	-131	049	259	156	-037	-030	-094
46	FOCS	636	-011	-108	-063	-081	-164	-012	-140	-116	100	271	164	-194	-130
47	MODS	592	-013	-235	040	-013	-059	178	-090	-088	048	130	-010	-055	-047
48	PSS	552	-044	-079	-052	014	-132	212	049	-100	033	087	-130	004	158
49	REDS	346	067	029	069	-110	-298	-135	008	-301	133	-386	-207	-051	-018
50	INIS	734	-203	-046	-093	-013	-138	-063	-047	-103	160	-127	-148	025	-090

Table 4.2 (Contd.)

Sr. No.	Variable Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14
51	SCCS	519	116	-004	-012	-098	-091	-244	011	-171	059	228	-068	079	-089
52	OBPA	523	305	026	-238	173	148	-157	467	-090	-234	127	-167	-131	-115
53	AQPA	542	305	039	-209	214	159	-175	470	-067	-212	148	-167	-115	-122
54	SMPA	549	200	028	-227	212	161	-216	423	-064	-127	166	-160	-146	-096
55	PRT	452	225	-025	-211	168	215	114	524	-034	-032	066	-179	045	-071
56	PIT	232	143	018	-120	090	111	-058	-222	089	128	060	-190	-246	264
57	RAV	495	-171	629	173	-415	-030	-027	046	155	000	-032	-023	-035	-071
58	BAV	543	-185	599	150	-426	-025	-003	078	115	.019	-062	-018	-053	-052
59	AUAV	536	-143	620	126	-456	003	-066	052	107	-001	-029	-002	-037	-054
60	MOAV	543	-139	625	119	-457	003	-056	037	101	-001	-019	013	-026	-047
61	SEAV	481	-180	652	088	-423	018	-060	115	130	010	-030	046	-008	-031
62	INAV	480	-202	640	085	-390	041	-039	174	094	.034	-041	.057	-012	.009
63	APAV	541	-188	573	124	-447	037	-100	098	056	-013	-065	-023	-020	-009
64	PAAV	575	-183	579	083	-429	021	-023	141	049	-000	-094	010	-063	020
65	IDAV	408	-156	617	190	-307	004	020	.187	.106	-007	-038	.062	034	.012
66	SEG	525	-129	-323	082	-292	585	-235	-180	-182	063	.018	-040	035	-006
67	REG	561	-134	-326	085	-257	549	-242	-189	-155	035	-008	-051	037	.019
68	INEG	600	-166	-308	074	-225	553	-230	-158	-142	030	021	-039	044	-039
69	AMEG	545	-149	-262	101	-271	582	-212	-209	-117	033	006	-059	008	-016
70	AAEG	539	-148	-347	071	-218	550	-212	-157	-188	052	047	-034	084	091
71	SPEG	521	-154	-275	093	-247	.542	-219	-219	-225	.038	037	-035	112	.006
72	LBB	516	-192	073	018	-052	-003	152	.018	-229	-155	480	-085	079	-057
73	NBB	510	-086	094	-065	032	.000	106	-008	-269	-349	421	-111	139	-138
74	APBB	650	-095	-049	-118	082	-134	114	-058	-078	-122	145	-052	020	-344
75	ORBB	434	-160	144	-208	013	-111	185	-170	-250	-377	336	-150	130	-092
76	PVRE	570	-106	-094	095	.123	-082	198	049	-023	474	085	.036	096	-070
77	PNRE	594	-121	-136	093	122	-012	186	128	-004	472	119	-000	073	-014
78	NVRE	472	-083	-259	.024	095	190	276	291	400	154	001	-305	150	098
79	NNRE	471	-031	-279	-011	163	254	240	242	406	141	.025	-345	113	182
80	IARE	432	-020	-232	014	.163	211	.243	246	473	.080	-024	-334	118	154
81	CONS	139	236	-106	-069	-286	-078	-042	249	033	-081	201	331	354	221
82	APPL	042	-006	-151	-153	-176	.022	-036	115	127	177	131	562	325	120
83	PKNK	148	023	-070	-102	-207	-032	-057	178	.064	-097	.264	487	.408	324
84	ORAB	336	-196	198	-044	128	241	400	.033	-217	254	-144	094	-261	061
85	AQRB	329	-170	192	010	128	241	367	-022	-298	240	-089	.150	-234	113
86	BSCM	596	-167	-152	047	.031	.009	179	212	-032	106	122	-000	-210	.008
87	PLCM	720	-135	004	-060	-010	-137	034	-013	.046	202	.145	.048	-058	-117
88	GDCM	518	-172	176	-156	152	-059	182	-193	-151	090	-097	-085	-065	076
89	HACM	500	.269	112	.073	065	006	013	-009	.038	.001	.038	-179	130	.148
90	ARCM	345	-037	-042	-177	-010	158	461	050	-129	-284	-385	129	014	-043
91	IMCM	212	220	-171	-134	-289	008	518	.121	-032	-316	-223	140	016	-076
92	TSCM	358	102	-020	-007	-090	208	446	-054	-303	-171	-388	.140	066	.047
93	SQCM	330	.083	-048	-034	-229	171	345	.004	089	-095	-279	-015	178	-065
94	AFCM	688	-109	-205	022	.066	113	286	-124	097	.050	-098	-026	099	.014
95	CECM	443	-041	-201	-034	-014	240	401	.081	089	-331	-104	113	140	-031
96	ATCM	230	.071	-286	-067	-275	212	.295	-083	035	-171	-111	074	053	-334
97	MASS	316	-300	456	-377	549	142	-100	-138	050	-040	-013	129	095	020
98	DOAS	388	-345	455	-315	526	149	-079	-142	085	-040	.005	.123	101	013
99	IDAS	242	-330	422	-300	538	189	-023	-112	079	-102	-028	-012	046	023
100	TLAS	298	-294	412	-331	534	266	-018	-136	084	-089	-080	-021	062	080

Table 4.2(Contd.)

Sr. No.	Variable Code.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
101	PSAS	248	-287	461	-419	482	160	-198	-131	027	-097	-065	096	117	020
102	APAS	334	-367	404	-379	447	134	-187	-153	028	-028	-030	082	079	070
103	SPAS	177	-300	468	-352	457	160	033	-149	045	029	+046	066	011	088
104	SINT	442	649	125	-193	-010	016	105	-118	087	141	+045	085	-028	-054
105	SQN	417	695	192	-092	010	-041	-022	-109	023	125	-076	110	082	-041
106	SPQ	282	709	-109	-103	167	-070	-085	-138	082	-034	-112	-008	-001	-068
107	SEXP	396	774	110	-127	049	-000	-078	-093	037	033	+045	059	-052	-067
108	SSV	338	719	153	-091	049	-046	020	-054	-034	-011	028	037	-180	052
109	SPAC	303	726	112	-096	011	085	-158	-088	130	032	-002	-064	119	001
110	SAVA	401	493	064	-106	-054	-091	-087	-201	155	-020	-146	-183	108	-108
111	SIWE	535	577	112	-144	-091	055	021	-081	133	052	-038	030	-071	-031
112	SBB	374	580	152	-230	-015	121	-033	-120	-028	-135	076	-020	007	095
113	SRE	376	567	027	-037	069	025	-104	044	157	196	-072	-093	214	-002
114	SAC	336	669	099	-062	011	092	-067	-163	025	064	-158	025	146	012
115	SHAB	313	573	091	-150	000	127	254	013	-186	048	139	-182	-205	022
116	SCRM	430	524	222	-165	-037	-001	142	-025	-107	-014	057	098	-271	119
117	SASS	343	745	091	-171	-008	047	-059	-210	-019	009	-082	091	074	057
Eigen Value		25.42	8.70	7.73	6.70	5.73	4.52	3.51	3.12	2.91	2.62	2.43	2.33	2.27	1.88
Percent Variance		21.73	7.44	6.61	5.73	4.90	3.86	3.00	2.67	2.49	2.24	2.08	1.99	1.94	1.61
Percent Common Variance		31.82	10.90	9.68	8.39	7.18	5.65	4.39	3.90	3.65	3.28	3.05	2.91	2.84	2.36

All decimal points have been omitted in factor loadings.

in caption 4.1.0, this analysis overemphasised the first factor and the rest of the factors were subdued. This led to the formation of secondary factors, to which psychological meaning could not be attached. Therefore, interpretation of these factors was found difficult. Hence, only the rotated factors and their loadings have been discussed here. The rotated factor matrix (117 x 14) has been given in Table 4.3.

The interpretation of these rotated factors has been centred around only those variables which have loadings greater than or equal to ± 0.30 (Harman, 1967). The loadings with an asterick denotes that it is the highest for the variable. Details of the factors follow.

4.3.1 Varimax Factor I

Table 4.4 represents the significant loadings of varimax factor I arranged in descending order. This factor is characterised by significant loadings on forty three variables and accounts for 11.44 percent of the total variance. The percentage of common variance explained by the factor is 16.75. Of the forty three variables, twenty five have the highest loadings in the factor matrix. The first ten variables in the table and the respective loadings are as follows: teacher using head movements (0.752), using positive verbal reinforcement (0.718), using positive non-

TABLE 4.3

VARIMAX ROTATED FACTOR MATRIX

Sr. No.	Variable Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	h^2
1	INT	228	102	-088	196	-018	032	-082	-347*	220	-114	-021	-036	-334	270	485
2	TAS	170	172	-005	602*	022	-105	-000	-129	082	106	-034	-025	-087	-192	513
3	IIT	165	095	021	602*	-003	-091	-103	-111	107	011	-200	060	-059	-137	508
4	TINT	124	-089	-007	521*	-070	-039	-121	288	-110	045	-104	095	-202	-148	495
5	TQN	147	032	112	695*	-006	012	-074	077	027	-067	036	167	-016	-036	565
6	TPQ	098	105	-031	577*	-047	028	-045	-056	-055	-162	-065	-203	-217	-108	497
7	TEXP	054	062	107	621*	-067	-012	-139	117	-066	-026	107	-045	083	-051	469
8	TSV	062	020	097	623	-089	125	-077	060	-033	-117	453	069	-132	-012	493
9	TPAC	-093	039	117	450*	-022	-009	-000	-262	-044	-164	096	198	034	169	402
10	TAVA	055	041	115	761*	-055	027	065	112	008	085	064	099	070	-003	644
11	TIWE	-016	018	148	722*	-002	118	122	-144	-083	089	152	-013	026	039	633
12	TBB	-037	084	-009	643*	100	050	307	-146	054	038	052	-016	-016	167	586
13	TRE	127	067	-055	565*	-020	-015	-157	-002	157	094	-081	206	127	-065	471
14	TAC	-112	-024	-029	584*	072	185	284	-188	039	179	035	-237	084	-011	609
15	TRAB	-125	-067	-079	594*	-021	073	043	-036	-001	280	135	-090	068	194	535
16	TORM	102	088	099	720*	061	054	103	-100	-086	-050	-051	-027	103	-073	604
17	TABS	-003	063	067	695*	018	-037	119	124	-073	029	-059	-124	126	-049	566
18	PEG	551*	-017	111	075	095	055	546	-032	081	117	038	-207	011	077	704
19	APD	497	026	-074	108	049	072	616*	-078	045	213	-077	-184	013	104	755
20	CON	537	-031	-076	086	096	170	631*	-139	103	041	-076	-156	-048	064	807
21	REL	490	-070	-048	010	108	199	622*	-200	144	037	-107	-160	-053	100	797
22	GCQ	656*	108	211	094	123	157	034	-125	044	293	083	058	-190	-012	686
23	CONQ	644*	098	104	-037	060	-005	054	-185	084	153	034	148	-370	046	670
24	RELQ	646*	013	170	103	173	036	174	-151	225	156	004	100	-233	-007	680
25	SPEQ	612*	024	250	086	196	105	122	-169	079	291	-017	126	-253	005	710
26	PAUQ	412	133	153	-058	060	-026	051	-051	004	658*	-044	222	165	047	737
27	REPQ	337	029	147	105	071	-030	-090	-254	040	478*	080	097	-202	036	514
28	REPA	471*	-129	112	111	044	080	-120	-234	133	442	-050	173	130	082	610
29	SUFQ	647*	169	082	008	110	120	208	076	035	412	-050	-008	-030	055	707
30	TROQ	453*	202	060	-005	-011	199	131	-132	191	425	-077	-036	-026	163	576
31	SFIQ	397	174	126	-035	088	268	261	-036	-075	423*	-050	-064	-167	034	574
32	REFQ	078	221	078	067	-208	065	095	001	-009	486*	-020	106	-185	012	405
33	ICAQ	460	233	138	-003	117	171	113	-124	-064	472*	072	-075	-084	-083	608
34	LINE	553*	252	067	050	-054	209	058	-479	037	004	049	039	082	086	675
35	BCSE	310	287	017	044	007	168	153	-523*	-041	002	027	081	155	104	547
36	REIE	308	-002	030	-029	-014	175	103	-680*	136	152	103	028	-263	-171	752
37	CONE	332	004	002	-007	-022	205	044	-692*	107	147	090	035	-176	-151	730
38	VOCE	466	-015	102	-093	104	164	096	-599*	076	132	127	001	-056	026	687
39	FIDE	476	130	194	039	-027	254	064	-612	-053	035	-006	017	185	115	778
40	VACE	434	-141	131	010	016	119	081	-586*	085	089	140	-057	-018	-014	628
41	PAUE	243	098	142	135	-121	-128	110	-180	008	514*	008	214	236	-011	549
42	FACE	660*	161	016	136	053	037	006	-124	154	149	192	152	011	111	618
43	HEMT	752*	107	081	023	-003	083	-015	-173	021	069	114	008	133	098	667
44	HAMT	677*	064	007	092	083	201	040	-304	026	-038	145	-027	-092	056	648
45	BOMT	617*	136	174	014	203	019	-072	-033	-005	-058	117	147	131	-082	541

Table 4.3 (contd.)

Sr. No.	Variable Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	h^2
46	FOCS	614*	212	136	-007	-022	170	088	-240	-004	-030	-194	242	147	051	658
47	MODS	546*	136	011	091	-064	196	034	-154	150	067	071	212	113	-019	483
48	PSS	453*	108	092	015	027	050	049	-069	116	267	208	215	176	006	441
49	REDS	297	143	188	024	-131	046	138	118	047	455*	-154	-175	-024	-297	549
50	INTS	659*	086	242	-041	148	239	145	-035	063	245	056	016	-037	-167	699
51	SOCS	369*	271	179	034	-043	241	191	023	-178	145	-060	244	-081	049	464
52	OBPA	077	403	087	-019	110	081	710*	-083	032	083	209	507	029	-055	856
53	AQPA	095	411	088	026	136	084	716*	-077	-000	062	231	304	017	-048	882
54	SMPA	134	419	079	-002	147	121	681*	-085	-074	052	218	263	055	-052	838
55	PRT	149	289	048	-025	078	045	563*	121	166	003	423	203	106	015	707
56	PIT	059	296*	-026	-047	146	154	-121	-222	-184	110	168	-008	227	-163	355
57	RAV	153	072	920*	109	081	035	-044	-059	023	028	007	063	-024	-039	907
58	BAV	196	068	921*	085	071	058	-008	-054	070	060	016	050	025	-039	922
59	AUAV	153	117	933*	065	078	099	-008	-055	026	052	-020	072	-002	-010	939
60	MOAV	159	127	931*	064	087	101	-024	-053	032	053	-028	082	004	007	946
61	SEAV	115	072	931*	040	129	052	018	-024	022	026	-002	042	012	052	913
62	INAV	116	040	911*	046	143	053	060	005	031	045	026	025	074	073	888
63	APAV	139	063	907*	058	085	155	046	-040	034	118	000	052	009	-001	902
64	PAAV	172	076	910*	035	099	103	071	-052	091	127	017	037	090	007	927
65	IDAV	078	022	828*	168	112	-032	037	028	057	045	046	033	045	-089	754
66	SEG	203	047	101	021	-045	933*	075	-103	095	008	057	039	037	018	958
67	REG	226	054	096	040	-016	909*	078	-143	102	053	073	028	014	012	938
68	INEG	268	039	116	049	022	896*	121	-137	111	006	081	062	000	012	949
69	AMEG	196	048	150	053	003	898*	046	-151	107	-011	079	043	023	-023	918
70	AAEG	226	026	043	041	002	896*	072	-102	083	080	107	059	061	087	914
71	SPEG	216	029	093	059	014	901*	031	-051	099	053	025	086	010	042	898
72	IBB	362	-036	214	094	084	173	069	-007	028	065	047	637*	096	083	658
73	NBB	269	068	145	088	169	149	149	-006	122	133	-018	711*	-046	039	715
74	APBB	581*	132	120	022	145	082	184	-101	194	-017	-029	375	-124	-129	653
75	ORBB	265	036	131	-064	256	050	-029	-035	176	186	-070	693*	-062	-039	719
76	PVRE	718*	069	088	161	037	093	025	150	-006	-059	197	-035	-181	044	666
77	PNRE	696*	048	083	154	025	144	087	121	-027	-052	291	-022	224	066	704
78	NVRE	362	012	036	058	005	118	118	-080	158	-033	785*	-020	-009	014	812
79	NNRE	308	076	-040	059	062	164	105	-129	111	-001	826*	-011	031	-002	859
80	IARE	260	073	-005	082	065	086	096	-160	141	010	813*	-039	-037	-012	811
81	CONS	317	191	080	-088	-216	010	088	030	050	114	043	091	-079	660*	574
82	APPL	162	016	-004	-165	-030	065	-016	046	028	-161	-050	-158	-016	692*	594
83	PKNK	639	038	079	-081	-012	049	014	-032	029	095	008	093	-042	816*	709
84	ORAB	255	-030	179	069	263	086	074	083	277	-066	053	-060	584*	-156	641
85	AQRB	241	-017	147	130	-253	130	-004	-000	-045	-024	-025	-022	609*	-089	628
86	BSCM	510*	-028	142	088	-020	124	258	-185	096	015	206	139	286	-013	559
87	PICM	682*	144	273	015	112	118	110	-136	-018	-013	-061	025	072	010	643
88	GDCM	422*	103	162	-005	362	062	-070	-016	145	212	015	087	211	-186	507
89	RACM	203	406*	155	205	078	090	025	-008	010	230	251	123	-013	013	418
90	ARCM	125	055	057	-053	151	041	114	-052	750*	101	038	021	132	-034	658

Table 4.3 (contd.)

Sr.No.	Variable Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	h^2
91	IMCM	018	185	049	-131	-234	-020	063	-091	734*	-002	069	113	079	089	693
92	TSCM	105	164	067	091	027	177	-004	080	714*	190	-048	-007	229	-006	690
93	SQCM	132	161	187	-037	-062	140	-057	018	543*	015	209	-035	-059	012	450
94	AFCM	556*	114	056	128	140	265	-045	154	357	063	286	036	042	-007	674
95	CECM	185	044	016	051	085	158	106	-182	629*	-015	250	175	-015	145	626
96	ATCM	153	098	002	-110	-203	246	002	-089	536*	-228	013	106	-125	-035	522
97	MASS	152	045	106	-010	934*	-025	089	002	-023	-022	-022	047	017	013	921
98	DOAS	175	002	144	033	915*	-010	061	-018	-020	-043	007	057	007	016	899
99	IDAS	068	-041	085	029	861*	-047	052	-016	043	-029	097	095	040	-103	794
100	TLAS	054	026	086	015	901*	043	055	-027	057	012	131	044	048	-092	862
101	PSAS	047	042	120	-080	914*	016	116	015	-038	027	-061	024	-055	001	884
102	APAS	163	-011	144	-073	880*	069	080	-034	-077	057	-029	022	002	002	850
103	SPAS	068	-006	109	-054	821*	-068	-038	027	-047	-062	033	072	160	-030	739
104	SINT	211	809*	080	-009	001	-017	002	-019	088	-088	042	038	092	045	735
105	SQN	160	829*	113	098	009	-024	030	073	066	031	-048	-061	-018	072	758
106	SPQ	062	795*	-064	109	042	-095	067	-018	013	033	-032	-081	-093	-067	689
107	SEXP	093	883*	016	078	-032	-006	118	-050	000	-021	-037	052	004	019	816
108	SSV	028	791*	032	094	-054	-092	102	-092	023	072	-047	075	163	-026	708
109	SPAC	-031	815*	031	068	-014	075	049	019	-049	034	108	-013	-139	048	717
110	SAVA	167	643*	106	-004	-012	044	-037	-053	071	120	076	-016	-275	-145	581
111	SIWE	193	759*	192	002	-016	076	068	-131	118	-012	080	005	036	003	699
112	SBB	-040	720*	059	-033	098	103	053	-074	076	112	026	191	040	058	614
113	SRS	168	658*	031	103	-025	057	101	121	-041	051	245	-125	-146	064	605
114	SAC	036	772*	021	107	014	114	-011	076	106	081	013	-108	-082	038	666
115	SRAB	070	632*	-005	026	-062	-005	109	001	171	-097	-062	197	409	080	676
116	SRCM	091	661*	169	005	015	-057	095	-132	109	083	-062	143	352	002	671
117	SASS	026	861*	-020	022	016	081	-020	-000	100	101	-072	-028	-015	085	784
Percent variance		11.44	8.64	7.53	5.93	5.76	5.50	3.73	3.50	3.21	3.06	2.92	2.65	2.34	2.09	68.30
Percent common variance		16.75	12.65	11.03	8.68	8.43	8.05	5.46	5.12	4.71	4.48	4.27	3.88	3.43	3.06	100 percent

Decimals have been omitted in factor loadings.

Asterick denotes the highest loading for the variable.

TABLE 4.4

VARIMAX FACTOR I

Sr.No. as given in the Correlation Matrix	Variable	Code	Leading
43	teacher using head movements	HEMT	752*
76	using positive verbal reinforcement	PVRE	718*
77	using positive nonverbal reinforcement	PNRE	696*
87	planning for the day's lesson beforehand	PLCM	682*
44	using hand movements	HAMT	677*
50	changing the interaction style	INTS	659*
42	using facial cues	FACS	660*
22	asking grammatically correct questions	GCQ	656*
29	sufficiency of the number of questions	SUFQ	647*
24	asking relevant questions	RELQ	646*
23	asking concise questions	CONQ	644*
83	linking students' previous knowledge with new knowledge	PKNK	639
45	moving purposefully in the class	BOMT	617*
46	focusing the important points	FOCS	614*
25	asking specific questions	SPEQ	612*
74	appropriateness of written work on the blackboard	APBB	581*
94	accepting feelings and/or ideas of pupils	AFCM	556*

Table 4.4(contd.)

Sr.No.as given in the Correlation Matrix	Variable	Code	Leading
34	using explaining links	LINE	553*
18	using previous knowledge of pupils for introducing the lesson	PKG	551*
47	modulating the voice	MODS	546*
20	maintaining continuity while introducing the lesson	CON	537
86	making a beginning statement	BSCM	510*
19	using appropriate devices for introducing	APD	497
21	uttering relevant statements and questions while introducing	REL	490
39	speaking fluently	PLUE	476
28	not repeating students' answers often	REPA	471*
38	using appropriate vocabulary	VOCE	466
33	asking increasing critical awareness questions	ICAQ	460
48	talking with proper speed	PSS	453*
30	asking prompting questions	RROQ	453*
40	avoiding vague words and phrases	VAGE	434
88	giving directions for classroom management	GDCM	422*
26	pausing after a question	PAUQ	412
31	asking seeking further information questions	SFIQ	397
51	changing the sensory channels	SCCS	369*
72	legible writing on the blackboard	LBB	362

Table 4.4(contd.)

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
78	avoiding negative verbal reinforcement	NVRE	362
27	not repeating the questions often	REPQ	337
37	maintaining continuity in the sequence of ideas	CONE	332
81	consolidating the major points	CONS	317
35	using beginning and concluding statements	BCSE	310
36	avoding irrelevant statements	RELE	308
79	avoiding negative nonverbal reinforcement	NNRE	308

Percentage of total varaince - 11.44

Percentage of common variance - 16.75

Asterick denotes the highest loading for the variable.

verbal reinforcement (0.696), planning for the day's lesson beforehand (0.682), using hand movements (0.677), changing the interaction style (0.659), using facial cues (0.660), using grammatically correct questions (0.656), sufficiency of the number of questions (0.647), and asking relevant questions (0.646). These loadings also denote the highest for the variable.

All the forty three variables belong to the domain of process variable, i.e., teacher classroom behaviour. Nine teaching skills that are generally employed while teaching a lesson are represented by these variables. They are the skills of (i) introducing the lesson, (ii) fluency in questioning, (iii) probing questioning, (iv) explaining, (v) stimulus variation, (vi) using the blackboard, (vii) reinforcement, (viii) achieving closure, and (ix) classroom management. Of these skills, all components of the skills of introducing, fluency in questioning and explaining are covered, whereas most of the components are covered under the skills of probing questioning, stimulus variation and reinforcement.

The first fifteen variables in the matrix belong to the skills of fluency in questioning, stimulus variation and reinforcement, except for two variables which belong to the skills of classroom management and achieving closure. The behavioural functions implicit in these variables are as follows: the variables namely, asking grammatically correct

questions, asking relevant, concise and specific questions, and sufficiency of the number of questions indicate the teacher's efforts to increase pupil activity through proper questioning; the variables, namely, using positive verbal and nonverbal reinforcements indicate the teacher's efforts to encourage pupil participation in the class activities; the variables, namely, using head movements, hand movements, moving purposefully in the class, changing the interaction style, and focusing the important points denote the teacher's efforts to draw and sustain the attention of the pupils to what is being taught in the class. The behavioural functions implicit in other variables also indicate the teacher's efforts to create an environment that is conducive to pupil learning. Thus, this factor denotes, through its different variables, the competency required of a teacher to maximise pupil learning. This necessitates the mastery over the skills that are covered by the factor, selection of the appropriate skill for a particular situation and exposition of these skills to an appreciable degree of excellence. Therefore, this factor is named, "General Teaching Competency".

4.3.2 Varimax Factor II

The significant loadings of Varimax Factor II arranged in descending order are presented in Table 4.5. This factor is characterised by significant loadings on eighteen variables and shares 8.64 percent of the total variance. The percentage of common variance explained by this factor is 12.65.

TABLE 4.5

VARIMAX FACTOR II

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
107	Student liking for explaining	SEXP	883*
117	giving assignment	SASS	861*
105	questioning	SQN	829*
109	pacing the lesson	SPAC	815*
104	introducing the lesson	SINT	809*
106	probing questioning	SPQ	795*
108	stimulus variation	SSV	791*
114	achieving closure	SAC	772*
111	illustrating with examples	SIWE	759*
112	using the blackboard	SBB	720*
116	classroom management	SCRM	661*
113	reinforcement	SRE	658*
110	using audio-visual aids	SAVA	643*
115	recognising attending behaviour	SRAB	632*
54	making statements to check pace	SMPA	419
53	asking questions to check pace	AQPA	411*
89	rewarding pupils' attending behaviour	RACM	406*
52	observation of pupils to check pace	OBPA	403

Percentage of total variance - 8.64
Percentage of common variance-12.65

Asterick denotes the highest loading for the variable.

Of the eighteen variables, fifteen variables have the highest loadings in the factor matrix. The first fourteen variables and the respective loadings are as follows:student liking for explaining (0.883), giving assignment (0.861), fluency in questioning (0.829), pacing the lesson (0.815), introducing the lesson (0.809), probing questioning(0.795), stimulus variation (0.791), achieving closure (0.772), illustrating with examples (0.759), using the blackboard (0.720), classroom management (0.661), reinforcement(0.658), using audiovisual aids (0.643) and recognising attending behaviour (0.632).

These fourteen variables belong to the domain of product variable measured by the Student Liking Scale. The remaining four variables belong to the domain of process variable,i.e., teacher classroom behaviour. Of these, three belong to the skill of pacing and the fourth to that of classroom management. The behaviours represented by the first fourteen variables are students' liking for their teachers with respect to the fourteen teaching skills. This would indicate the students' liking for their teacher developed as a result of the effects the teacher has produced on them through the fourteen teaching skills. The intents implied in the three components of the skill of pacing also denote teacher's concern for students with regard to his pace of teaching. This would further denote that the teacher is concerned about whether his students are moving along with him when he is teaching.

Therefore he either asks questions, makes statements or observes the students to know if his pace suits them. The variable 'rewarding pupils' attending pupil behaviour' also implies that he encourages those who are attentively listening to him. Thus, this factor is portrayed by the teacher's awareness of students' likes and dislikes about his behaviour. Therefore, this factor is named "Competency of Teacher Concern for Students".

4.3.3 Varimax Factor III

The significant loadings of varimax factor III arranged in descending order are given in Table 4.6. This factor has significant loadings on nine variables and these are also the highest loadings for these variables. The factor accounts for 7.53 percent of total variance and 11.03 percent of common variance.

The nine variables explained by this factor belong to the domain of process variable, i.e., teacher classroom behaviour. The variables and the respective loadings are as follows: teacher using aids which are authentic and uptodate (0.933), aids that are moderately used (0.931), aids that are sequenced (0.931), that are big enough (0.921), that are realistic (0.920), that are integrated with the other aids (0.911), that are provided in a proper atmosphere and environment (0.910), that are used at the proper time(0.907), and that are cognizant of individual differences of pupils (0.828).

TABLE 4.6

VARIMAX FACTOR III

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
59	using aids that are authentic and uptodate	AUAV	933*
60	aids moderately used	MOAV	931*
61	aids that are sequenced	SEAV	931*
58	aids that are big enough	BAV	921*
57	realistic aids	RAV	920*
62	integrated with other aids	INAV	911*
64	aids provided in a proper atmosphere and environment	PAAV	910*
63	aids used at the appropriate time	APAV	907*
65	aids cognizant of individual differences of pupils	IDAV	828*

Percentage of total variance - 7.53

Percentage of common variance - 11.03

Asterick denotes the highest loading for the variable.

The behavioural processes represented by the variables are indicated in the teacher behaviours that make the teaching clear and interesting to the pupils by the use of audio-visual aids. The teacher, through these behaviours, would make his teaching more meaningful by giving a concrete evidence to what has been theoretically imparted. Besides, he would also cater to the individual needs of his students. Thus, through the behaviours explicated under this factor, he would take care of three aspects of the use of audio-visual aids, namely, the nature of aids, the nature of pupils and the method of using the aids.

It is evident that the effective use of the aids requires teacher's competency of choosing the appropriate aid with due consideration to the individual needs of the students and of presenting it effectively to the students. Therefore, this factor is named, "Competency of Using Audio-Visual Aids".

4.3.4 Varimax Factor IV

The significant loadings of varimax factor IV arranged in descending order are presented in Table 4.7. This factor is characterised by significant loadings on sixteen variables and these are also the highest loadings for these variables. This factor accounts for 5.93 percent of ~~XXX~~ total variance and 11.03 percent of ~~XXX~~ common variance.

The sixteen variables accounted for by this factor belong to the domain of presage variables. Of these, the

TABLE 4.7

VARIMAX FACTOR IV

Sr.no. as given in the Correlation Matrix	Variable	Code	Loading
10	teacher's self perception about using audio-visual aids	TAVA	761*
11	illustrating with examples	TIWE	722*
16	classroom management	TCRM	720*
17	giving assignment	TASS	695*
5	questioning	TQN	695*
12	using the blackboard	TBB	643*
8	stimulus variation	TSV	623*
7	explaining	TEXP	621*
2	teacher's attitude towards teaching	TAS	602*
3	teacher's interest in teaching	IIT	602*
15	teacher's self perception about recognising attending behaviour	TRAB	594*
14	achieving closure	TAC	584*
6	probing questioning	TPQ	577*
13	reinforcement	TRE	565*
4	introducing the lesson	TINT	521*
9	pacing the lesson	TPAC	450*

Percentage of total variance — 5.93
Percentage of common variance — 8.68

Asterick denotes the highest loading for the variable.

ninth variable is a measure of teacher's attitude towards teaching, the tenth, a measure of teacher's interest in teaching and the remaining fourteen are measures of teacher's self perception of his teaching behaviour. The first eight variables and their loadings are as follows: teacher's self perception about the skills of using the audio visual aids (0.761), illustrating with examples(0.722), classroom management (0.720), giving assignment (0.695), fluency in questioning (0.695), using the blackboard (0.643), stimulus variation (0.623) and explaining (0.621).

The behavioural functions represented by these variables indicate the importance of teacher characteristics, namely, his attitude towards teaching, his interest in teaching and his self perception of his teaching behaviour. The fundamental processes implicit in these variables cannote the inclinations of the teacher towards teaching. These inclinations comprise three aspects: (i) those denoted in terms of attitude of the teacher, (ii) those denoted in terms of his interest in teaching, and (iii) those denoted in terms of his self perception of his teaching. Thus, this factor accounts for the teacher traits that significantly contribute to competent teaching. Therefore, this factor is named, "Competency of Professional Perception".

4.3.5 Varimax Factor V

The significant leadings of varimax factor V arranged in descending order are presented in Table 4.8. This factor

TABLE 4.8

VARIMAX FACTOR V

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
97	motivating the pupils while giving assignment	MASS	934*
98	defining the objective of the assignment	DOAS	915*
101	giving it at the proper stage of the lesson	PSAS	914*
100	setting appropriate time limit	TLAS	901*
102	providing apportunities for application	APAS	880*
99	considering the individual differences among pupils	IDAS	861*
103	supervising the assignment	SPAS	821*
88	giving directions for classroom management	GDCM	362

Percentage of total variance - 5.76

Percentage of common variance _ 8.43

Asterick denotes the highest loading for the variable.

accounts for significant loadings on eight variables; of the eight variables, the first seven have the highest loadings for the variables. The percentage of total variance explained by this factor is 5.76 and that of common variance is 8.43.

All the eight variables included in this factor belong to the domain of process variable, i.e., teacher classroom behaviour. The variables and their loadings are as follows: motivating the pupils while giving assignment (0.934), defining the objective of the assignment (0.915), giving it at the proper stage of the lesson (0.914), setting appropriate time limit (0.901), providing opportunities for application (0.880), considering the individual differences among pupils (0.861), superivising the assignment (0.821) and giving directions for classroom management (0.362).

The behavioural meaning represented by these variables relates to the teacher's efforts to make students understand the subject more clearly by giving interesting and challenging assignments. These efforts can be visualised to be present at three stages of giving the assignment. These stages and the respective variables related to the stages are as follows: (i) efforts needed in the preparations prior to giving the assignment indicated in the variables, namely, motivating the pupils, defining the objective of the assignment and considering the individual differences of pupils; (ii) efforts needed in the process of giving the assignment,

represented by the variables, namely, giving it at the proper stage of the lesson, setting appropriate time limit and providing opportunities for application, and (iii)efforts needed subsequent to giving the assignment, indicated by the variable, namely, supervising the assignment.

Thus, it is evident that the fundamental processes involved in this factor comprise the teacher's competency of making appropriate efforts at all the three stages of giving assignment resulting in clear understanding of the lesson on the part of pupils. Therefore, this factor is named, "Competency of Giving Assignment".

4.3.6 Varimax Factor VI

The significant loadings of varimax factor VI arranged in descending order are presented in Table 4.9. This factor is characterised by significant loadings on six variables and these loadings are also the highest for the variables. The factor accounts for 5.50 percent of total variance and 8.05 percent of common variance.

All the six variables included in this factor belong to the domain of process variable, i.e., teacher classroom behaviour. The variables and the respective loadings are as follows: illustrating with simple examples (0.933), examples relevant to the concept or rule (0.909), sufficiency of the number of examples (0.901), using appropriate media while

TABLE 4.9

VARIMAX FACTOR VI

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
66	illustrating with simple examples	SEG	933*
67	examples relevant to the concept or rule	REG	909*
71	sufficiency of the number of examples	SFEG	901*
69	using appropriate media while illustrating	AMEG	898*
68	illustrating with interesting examples	INEG	896*
70	using appropriate approach for illustrating	AAEG	896*

Percentage of total variance - 5.50

Percentage of common variance - 8.05

Asterick denotes the highest loading for the variable.

illustrating (0.898), illustrating with interesting examples (0.896), and using appropriate approach for illustrating (0.896).

The behavioural functions denoted by these variables indicate the teacher's efforts to make even difficult things easy by illustrating with examples. These efforts are implicit in three aspects of giving examples. These aspects and the respective variables are as follows: (i) the aspect of the nature of examples, as indicated by variables, namely, illustrating with simple examples, with interesting examples and examples relevant to the concept or rule, (ii) the aspect of process involved in illustrating, as denoted by the variables, namely, using appropriate media while illustrating and using appropriate approach for illustrating and (iii) the aspect of adequacy of the number of examples, indicated by the variable, namely, sufficiency of the number of examples.

Thus, this factor portrays the teacher's efforts underlying the three aspects of illustrating with examples resulting in making difficult things easy for the students. These efforts are implicit in the competency of teachers to illustrate with examples. Therefore, this factor is named, "Competency of Illustrating with Examples".

4.3.7 Varimax Factor VII

The significant loadings of varimax factor VII arranged in descending order are presented in Table 4.10. This factor

TABLE 4.10

VARIMAX FACTOR VII

Sr.No.as given in the Correlation Matrix	Variable	Code	Loading
53	asking questions to check pace	AQPA	716*
52	observation of pupils to check pace	OBPA	710*
54	making statements to check pace	SMPA	681*
20	maintaining continuity while introducing	CON	631*
21	uttering relevant statements and questions while introducing	REL	622*
19	using appropriate devices while introducing	APD	616*
55	using pace reducing techniques	PRT	563*
18	using previous knowledge of pupils to introduce	PKG	546
12	teacher's self perception about using the blackboard	TBB	307

Percentage of total variance – 3.73

Percentage of common variance – 5.46

Asterick denotes the highest loading for the variable.

is characterised by significant loadings on nine variables. Of these, the first seven loadings are the highest for the variables. The factor explains 3.73 percent of total variance and 5.46 percent of common variance.

Except for the ninth variable, all the variables belong to the domain of process variable, i.e., teacher classroom behaviour. The ninth variable belongs to the domain of presage variables. The variables and their loadings are as follows: teacher asking questions to check pace (0.716), observation of pupils to check pace (0.710), making statements to check pace (0.681), maintaining continuity while introducing (0.631), uttering relevant statements and questions while introducing (0.622), using appropriate devices while introducing (0.616), using pace reducing techniques (0.563), using previous knowledge of pupils to introduce (0.546), and teacher's self perception about the skill of using the blackboard (0.307).

The fundamental behavioural processes involved in this factor as denoted by the variables are implicit in the teacher's efforts to create interest and curiosity among students to learn physics and to make them follow what he teaches by adjusting his pace of teaching. These efforts indicate the teacher's concern specially when introducing the lesson. This factor shows two sets of variables: one, that helps him introduce the lesson, and two, that helps him in pacing the lesson. The competency required of the teacher to

effectively achieve the purposes intended by the exposition of these two groups of variables is evident in this factor. Therefore, this factor is named, "Competency of Pacing while Introducing".

4.3.8 Varimax Factor VIII

The significant loadings of varimax factor VIII arranged in descending order are given in Table 4.11. This factor is characterised by significant loadings on nine variables. Of these, seven loadings are the highest for the variables. The factor accounts for 3.50 percent of total variance and 5.12 percent of common variance.

Except for the eighth variable, all the variables belong to the domain of process variable, i.e., teacher classroom behaviour. The eighth variable belongs to the domain of presage variables. The variables and the respective loadings are as follows: maintaining continuity in the sequence of ideas (0.692), avoiding irrelevant statements (0.680), speaking fluently (0.612), using appropriate vocabulary (0.599), avoiding vague words and phrases (0.586), using beginning and concluding statements (0.523), using explaining links (0.479), teacher's intelligence (0.347), and using hand movements (0.304).

The behavioural processes involved in these variables are: the teacher describes the 'how', 'why' and sometimes 'what' of a concept, phenomenon, event, action, or condition. This,

TABLE 4.11

VARIMAX FACTOR VIII

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
37	maintaining continuity in the sequence of ideas	CONE	692*
36	avoiding irrelevant statements	RELE	680*
39	speaking fluently	FLUE	662*
38	using appropriate vocabulary	VOCE	599*
40	avoiding vague words and phrases	VAGE	586*
35	using beginning and concluding statements	BCSE	523*
34	using explaining links	LINE	479
1	teacher's intelligence	INT	347*
44	using hand movements	HAMT	304

Percentage of total variance - 3.50

Percentage of common variance - 5.12

Asterick denotes the highest loading for the variable.

he does through a set of interrelated statements which are logically sequenced and thus brings about an understanding in his students. The behaviour implied in the intelligence test also relies heavily on the capacity of the person to observe, think clearly and develop a systematic method of reasoning. The variable 'using hand movements' indicates the meaningful coordination of his hand movements with his verbal behaviour.

Thus, this factor draws heavily upon the logical organization of ideas using certain nonverbal gestures thus resulting in increased understanding about what is being described. Therefore, this factor is named, "Competency of Logical Exposition".

4.3.9 Varimax Factor IX

The significant loadings of varimax factor IX arranged in descending order are presented in Table 4.12. This factor is characterised by significant loadings on seven variables. Of these, six loadings are the highest for the variables. The factor accounts for 3.21 percent of total variance and 4.70 percent of common variance.

These variables belong to the domain of process variable, i.e., teacher classroom behaviour. The variables and the respective loadings are as follows: making the pupils assume responsibility (0.750), ignoring minor misbehaviour (0.734), changing the teaching strategy (0.714), controlling emotions

TABLE 4.12

VARIMAX FACTOR IX

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
90	making the pupils assume responsibility	ARCM	750*
91	ignoring minor misbehaviour	IMCM	734*
92	changing the teaching strategy	TSCM	714*
95	controlling emotions	CECM	629*
93	giving scope to ask questions and clarify doubts	SQCM	543*
96	avoiding threats of punishment	ATCM	536*
94	accepting feelings and/or ideas of pupils	AFCM	357

Percentage of total variance - 3.21

Percentage of common variance - 4.70

Asterick denotes the highest loading for the variable.

(0.629), giving scope to ask questions and clarify doubts (0.543), avoiding threats of punishment (0.536) and accepting feeling and/or ideas of pupils (0.357).

The behavioural functions represented by these variables indicate teacher behaviours which facilitate maintaining order in the classroom. The teacher, through these behaviours, undertakes appropriate measures to help students pay attention to what is being taught. Therefore, such a treatment follows the diagnosis of difficulties of pupils and the selection of appropriate remedial measures. And it results in attentiveness on the part of the pupils and a climate that is conducive to pupil learning.

Thus, this factor deals with different strategies that help the teacher maintain orderliness in the classroom. Therefore, this factor is named, "Competency of Classroom Management".

4.3.1 Varimax Factor X

The significant loadings of Varimax factor X arranged in descending order are given in Table 4.13. This factor is characterised by significant loadings on ten variables, of which seven are the highest loadings for the variables. This factor accounts for 3.06 percent of total variance and 4.48 percent of common variance.

The variables in this factor belong to the domain of process variable, i.e., teacher classroom behaviour. The

TABLE 4.13

VARIMAX FACTOR X

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
26	pausing after a question	PAUQ	658*
41	pausing to draw and sustain attention	PAUS	514*
32	asking refocusing questions	REFQ	486*
27	not repeating the questions often	RPPQ	478*
33	asking increasing critical awareness questions	ICAQ	472*
49	redirecting the questions to different pupils	REDS	455*
28	not repeating the students' answers often	REPA	442
30	asking prompting questions	PROQ	425
31	asking seeking further information questions	SFIQ	423*
29	sufficiency of the number of questions	SUFQ	412

Percentage of total variance - 3.06

Percentage of common variance - 4.48

Asterick denotes the highest loading for the variable.

variables and their loadings are as follows: pausing after a question (0.658), pausing to draw and sustain attention (0.514), asking refocusing questions (0.486), not repeating the questions often (0.478), asking increasing critical awareness questions (0.472), redirecting the questions to different pupils (0.455), not repeating the students' answers often (0.442), asking prompting questions (0.425), asking seeking further information questions (0.423), and sufficiency of the number of questions.

The behavioural processes involved in these variables include teacher asking questions, probing deep into the pupil responses and thus leading them to the correct response(s). The teacher also initiates pupil activity in the classroom by giving them time to think after the question is asked and by redirecting it to others, in case one pupil does not know the answer. In so doing, he ensures that the questions asked are adequate enough to initiate pupil participation.

Thus, this factor portrays teacher's efforts to stimulate pupil activity through the use of questions. Therefore, this factor is named, "Competency of the Use of Questions".

4.3.11 Varimax Factor XI

The significant loadings of varimax factor XI arranged in descending order are given in Table 4.14. This factor is characterised by significant loadings on four variables of which three are the highest loadings for the variables. The

TABLE 4.14

VARIMAX FACTOR XI

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
79	avoiding nonverbal negative reinforcement	NNRE	826*
80	avoiding inappropriate use of reinforcement	IARE	813*
78	avoiding negative verbal reinforcement	NVRE	785*
55	using pace reducing techniques	PRT	423

Percentage of total variance – 2.92

Percentage of common variance – 4.27

Asterick denotes the highest loading for the variable.

factor accounts for 2.92 percent of total variance and 4.27 percent of common variance.

The variables in this factor belong to the domain of process variable, i.e., teacher classroom behaviour. The variables and the respective loadings are as follows: avoiding nonverbal negative reinforcement (0.826), avoiding inappropriate use of reinforcement (0.813), avoiding negative verbal reinforcement (0.785) and using pace reducing techniques (0.423).

The behavioural processes involved in this factor consist of teacher avoiding the use of verbal and nonverbal negative as well as inappropriate reinforcers. This further involves strengthening the desirable pupil behaviours, reducing the pace of teaching in order that the pupils follow what the teacher is teaching and thus making the pupils participate more and more in the classroom discussion.

Thus, this factor deals with those teacher behaviours which initiate pupil participation and, therefore, it is named, "Competency of Initiating Pupil Participation".

4.3.12 Varimax Factor XII

The significant loadings of varimax factor XII arranged in descending order are presented in Table 4.15. This factor is characterised by significant loadings on six variables of which three are the highest loadings for the variables. This factor accounts for 2.65 percent of total variance and 3.88 percent of common vairance.

TABLE 4.15

VARIMAX FACTOR XII

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
73	neat writing on the blackboard	NBB	711*
75	organisation of the blackboard work	ORBB	693*
72	legible writing on the blackboard	LBB	637*
74	appropriateness of written work on the board	APBB	375
52	observation of pupils to check pace	OBPA	307
53	asking questions to check pace	AQPA	304

Percentage of total variance _ 2.65

Percentage of common variance _ 3.88

Asterick denotes the highest loading for the variable.

The variables in this factor belong to the domain of process variables, i.e., teacher classroom behaviour. The variables and their loadings are as follows: writing neatly on the blackboard (0.711), organising the blackboard work (0.693), writing legibly on the blackboard (0.637), appropriateness of written work on the blackboard (0.375), observation of pupils to check pace (0.307), and asking questions to check pace (0.304).

The behavioural functions implicit in these variables indicate the teacher behaviours which make the pupils understand whatever is written on the blackboard. This further comprises those behaviours which tell about teacher's neat and legible writing, appropriateness of the written work and the organisation of the blackboard work. The remaining two variables are not considered while naming the factor, because to conceive of a factor including these variables was found difficult and also the loadings of these variables are comparatively low (0.307 and 0.304).

Thus, this factor includes those variables which facilitate an effective use of the blackboard resulting in increased understanding on the part of the pupils. Therefore, this factor is named, "Competency of the Use of Blackboard".

4.3.13 Varimax Factor XIII

The significant loadings of varimax factor XIII arranged in descending order are given in Table 4.16. The factor is characterised by significant loadings on five variables, of

TABLE 4.16

VARIMAX FACTOR XIII

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
85	asking questions to recognise attending behaviour	AQRB	609*
84	observing verbal and nonverbal behaviours of pupils to recognise attending behaviour	ORAB	584*
115	student liking for redognizing attending behaviour	SRAB	409
116	student liking for classroom management	SCRM	352
1	teacher's intelligence	INT	-334

Percentage of total variance - 2.34

Percentage of common variance - 3.43

Asterick denotes the highest loading for the variable.

which two are the highest loadings for the variables. This factor accounts for 2.34 percent of total variance and 3.43 percent of common variance.

The variables in this factor belong to the domain of process variable i.e., teacher classroom behaviour. The variables and their loadings are as follows: teacher asking questions to recognised attending behaviour (0.609), observing verbal and nonverbal behaviour of pupils to recognise attending behaviour (0.584), student liking for recognising attending behaviour (0.409), student liking for classroom management (0.352) and teacher's intelligence (-0.334).

The behavioural processes implicit in these variables involve teacher's assessment of the degree of attentiveness of the pupils. This assessment consists of recognising the pupils' attending and nonattending behaviours through questioning and observation of verbal and nonverbal behaviours of pupils. This is done in order to ensure pupils' attentiveness which facilitates their learning. The fifth variable has a negative but a comparatively low loading. Including this variable in the factor for purposes of naming it has been found fifficult and therefore it has not been considered. However, further probing is essential to have a clearer and more meaningful interpretation of the factor.

Thus, this factor consists of those teacher behaviours which help the teacher diagnose the difficulties underlying

pupils' attentiveness. Therefore, this factor is named "Competency of Redognising Attending Behaviour".

4.3.14 Varimax Factor XIV

The significant loadings of varimax factor XIV arranged in descending order are presented in Table 4.17. This factor is characterised by significant loadings on three variables which are also the highest for the variables. This factor accounts for 2.09 percent of total variance and 3.06 percent of common variance.

The variables in this factor belong to the domain of process variable, i.e., teacher classroom behaviour. The variables and their loadings are as follows: linking students' previous knowledge with new knowledge (0.816), providing opportunities for application (0.692), and consolidating the major points (0.660).

The fundamental processes underlying the factor involve those teacher behaviours which help the teacher review and structure the information he has provided as a whole. Further, he evaluates the extent of realisation of the objectives that were set before the teaching began. In so doing, he derives a psychological satisfaction, for he becomes aware of how effectively he has taught. On the part of the pupils, this would result in understanding of the concept or a phenomenon as a whole and a satisfaction of achievement.

Thus, this factor describes the teacher behaviours that

help the teacher 'close' the lesson meaningfully. Therefore, this factor is named, "Competency of Achieving Closure".

TABLE 4.17

VARIMAX FACTOR XIV

Sr.No. as given in the Correlation Matrix	Variable	Code	Loading
83	Linking students' previous knowledge with new knowledge.	PKNK	816*
82	providing opportunities for application	APPL	692*
81	consolidating the major points	CONS	660*

Percentage of total variance - 2.09

Percentage of common variance - 3.06

Asterick denotes the highest loading for the variables.

4.4.0 Summary

The competencies identified in this study are presented in Table 4.18 along with their percentage of total variance and common variance.

TABLE 4.18

TEACHING COMPETENCIES

Sr. No.	Competency	Percentage of total variance	Percentage of common variance
1.	General Teaching Competency	11.44	16.75
2.	Teacher Concern for Students	8.64	12.65
3.	Using Audio-Visual Aids	7.53	11.03
4.	Professional Perception	5.93	8.68
5.	Giving Assignment	5.76	8.43
6.	Illustrating with Examples	5.50	8.05
7.	Pacing while Introducing	3.73	5.46
8.	Logical Exposition	3.50	5.12
9.	Classroom Management	3.21	4.71
10.	The Use of Questions	3.06	4.48
11.	Initiating Pupil Participation	2.92	4.27
12.	The Use of Blackboard	2.65	3.88
13.	Recognising Attending Behaviour	2.34	3.43
14.	Achieving Closure	2.09	3.06
	Total ...	68.30	100.00

A discussion of these results along with a profile of a competent physics teacher has been presented in the following Chapter, i.e., Chapter V.