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PRESERVICE TRAINING FOR SCIENCE TEACHING
AND THE SUBSEQUENT CLASSROOM PRACTICES
OF TEACHER-GRADUATES

DOROTHY ATLEEN GARDINER

VOLUME II

APPENDICES AND BIBLIOGRAPHY

MASSEY UNIVERSITY
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INTERVIEW SCHEDULE: LECTURERS

Purpose: To determine the types of Functional and Structural teaching patterns recommended by lecturers for the teaching of elementary school science.

General Instructions:*

This interview consists of TWO tasks each asking for specific types of information.

Let us start with the first task.

TASK 1

Think of an entire science lesson as being made up of 100 time units. What percentage of this time do you think an elementary science teacher should spend:

1. GIVING INFORMATION? Write your answer in cell 1.
2. PROMOTING UNDERSTANDING? Write your answer in cell 2.
3. DOING ACTIVITIES? Write your answer in cell 3.

Now start again with cell 1, and the number of time units you have allocated for "giving information".

What proportion of this time do you think an elementary science teacher should spend:

1. giving information about SCIENCE (cell 4);
2. giving information about SOCIAL RELATIONS (cell 5);
3. giving information about ORGANIZATION (cell 6).

* By the time the lecturers came to be interviewed they were already familiar with the general purposes of the study and had become accustomed to the presence of the researcher.

APPENDIX A: CONTINUED

Now starting with cell 2, and the number of time units you have allocated for "promoting understanding". What proportion of this time do you think an elementary science teacher should spend:

1. promoting understanding about SCIENCE (cell 7);
2. promoting understanding about SOCIAL RELATIONS (cell 8);
3. promoting understanding about ORGANISATION (cell 9).

Finally, starting with cell 3, and the number of time units you have allocated for "doing activities", what proportion of this time do you think an elementary science teacher should spend:

1. doing activities about SCIENCE (cell 10);
2. doing activities about SOCIAL RELATIONS (cell 11);
3. doing activities about ORGANIZATION (cell 12).

APPENDIX A: CONTINUED

Coding sheet for Task 1

	% of Class Time	Science	Social Relations	Organization
Giving Information	cell 1	cell 4	cell 5	cell 6
Promoting Understanding	cell 2	cell 7	cell 8	cell 9
Doing Activities	cell 3	cell 10	cell 11	cell 12

APPENDIX A: CONTINUEDTASK 2

Again think of an entire science lesson as being made up of of 100 time units. What percentage of this time do you think an elementary science teacher should spend:

1. Working with INDIVIDUAL PUPILS? Write your answer in cell 1.
2. Working with SMALL GROUPS? Write your answer in cell 2.
3. Working with the WHOLE CLASS? Write your answer in cell 3.

When you have written you answers down start again with cell 1, and the number of time units you have allocated for the teacher's "working with individual pupils". What proportion of this time do you think an elementary science teacher should spend:

1. taking a LEADING role (cell 4);
2. taking an ATTENDING role (cell 5);
3. STANDING ASIDE AND WATCHING (cell 6).

Now starting with cell 2, and the number of time units you have allocated for the teacher's "working with small groups". What proportion of this time do you think an elementary science teacher should spend:

1. taking a LEADING role (cell 7);
2. taking an ATTENDING role (cell 8);
3. STANDING ASIDE AND WATCHING (cell 9).

Finally, starting with cell 3, and the number of time units you have allocated for the teacher's "working with the whole class". What proportion of this time do you think an elementary science teacher should spend:

APPENDIX A: CONTINUED

- 1. taking a LEADING role (cell 10);
- 2. taking an ATTENDING role (cell 11);
- 3. STANDING ASIDE AND WATCHING (cell 12).

Coding sheet for Task 2

	% of Class Time	Teacher taking a Leading role	Teacher taking an Attending role	Teacher standing aside and watching
Teacher working with Individual Pupils	cell 1	cell 4	cell 5	cell 6
Teacher working with Small Groups	cell 2	cell 7	cell 8	cell 9
Teacher working with the Whole Class	cell 3	cell 10	cell 11	cell 12

APPENDIX B.1

LECTURERS' FUNCTIONAL TRANSACTIONS: LESSONS 1,4, AND 7

LESSON 1

% TIME													
INFORMATION DISSEMINATION				INTELLECTUALIZATION				OPERATION				O T H E R	
SC.	SC. TCH.	SOC.	ORG.	SC.	SC. TCH.	SOC.	ORG.	SC.	SC. TCH.	SOC.	ORG.		
LECTURERS:													
1	32.7	0.6	8.0	13.1	20.6	-	-	0.4	22.1	-	-	1.9	0.6
2	13.5	3.7	2.8	35.0	10.0	1.5	-	-	28.3	-	-	4.7	0.5
3	14.0	8.8	11.0	57.0	2.1	1.4	0.7	-	2.4	-	-	-	2.6
4	47.4	14.7	4.2	7.1	6.3	2.5	-	-	1.9	13.5	-	-	2.4
5	0.4	38.4	1.9	1.6	-	36.4	-	-	-	15.3	-	1.2	4.8

SC. = SCIENCE

SOC. = SOCIATION

SC. TCH. = SCIENCE TEACHING

ORG. = ORGANIZATION

APPENDIX B.1: CONTINUED

LESSON 4

% TIME													
INFORMATION DISSEMINATION				INTELLECTUALIZATION				OPERATION				O T H E R	
SC.	SC. TCH.	SOC.	ORG.	SC.	SC. TCH.	SOC.	ORG.	SC.	SC. TCH.	SOC.	ORG.		
LECTURERS:													
1	2.1	22.4	4.65	19.0	0.05	7.8	-	0.4	-	40.9	-	1.0	1.7
2	7.9	21.2	0.6	8.2	3.1	0.7	-	-	3.3	50.3	-	2.7	2.0
3	-	26.3	0.5	4.7	-	20.4	-	-	-	43.9	-	0.7	3.5
4	4.6	13.2	1.1	3.4	2.6	3.9	0.2	-	-	65.9	-	0.1	5.0
5	11.3	-	3.8	12.3	4.8	-	-	1.7	-	61.9	-	2.3	1.9

SC. = SCIENCE
SOC. = SOCIATION

SC. TCH. = SCIENCE TEACHING
ORG. = ORGANIZATION

APPENDIX B.1:CONTINUED

LESSON 7

% TIME													
	INFORMATION DISSEMINATION				INTELLECTUALIZATION				OPERATION				O T H E R
	SC.	SC. TCH.	SOC.	ORG.	SC.	SC. TCH.	SOC.	ORG.	SC.	SC. TCH.	SOC.	ORG.	
LECTURERS:													
1	0.3	39.6	2.1	11.6	-	8.0	0.3	-	-	38.0	-	0.1	-
2	-	22.5	2.5	30.4	-	5.1	-	0.5	-	33.0	-	1.6	4.4
3	2.6	42.8	3.8	10.4	1.8	15.4	-	-	-	22.1	-	-	1.1
4	22.9	37.4	3.0	4.1	16.3	10.6	0.4	1.9	-	-	-	-	3.4
5	16.4	18.7	7.9	9.1	13.7	25.7	0.1	-	-	-	-	0.5	7.9

SC. = SCIENCE
SOC. = SOCIATION

SC. TCH. = SCIENCE TEACHING
ORG. = ORGANIZATION

LECTURERS' STRUCTURAL TRANSACTIONS: LESSONS 1, 4 AND 7

LESSON 1

% TIME										
EMITTER			TARGET			AUDIENCE			O T H E R	
IND. PUP.	MULT. PUP.	WHL. CLASS.	IND. PUP.	MULT. PUP.	WHL. CLASS.	IND. PUP.	MULT. PUP.	WHL. CLASS.		
LECTURERS:										
1	22.9	5.6	21.1	12.9	10.3	-	0.3	20.8	6.1	-
2	17.4	1.2	33.5	9.5	1.8	-	0.6	35.0	1.0	-
3	17.2	0.3	53.2	17.9	2.9	-	0.2	5.7	2.6	-
4	16.6	-	33.4	29.14	2.0	-	0.72	15.74	2.4	-
5	16.59	1.51	28.02	14.73	19.24	-	0.04	15.04	4.83	-

IND. PUP. = INDIVIDUAL PUPIL
MULT. PUP. = MULTIPLE PUPIL
WHL. CLASS = WHOLE CLASS

LESSON 4

LECTURERS :

% TIME									
EMITTER			TARGET			AUDIENCE			O T H E R
IND. PUP.	MULT. PUP.	WHL. CLASS.	IND. PUP.	MULT. PUP.	WHL. CLASS.	IND. PUP.	MULT. PUP.	WHL. CLASS.	
14.9	0.5	29.7	4.9	0.6	-	9.9	32.1	1.6	5.8
14.0	0.3	16.7	8.7	0.5	-	1.8	55.1	2.9	-
22.2	4.6	17.5	5.8	1.8	-	-	44.6	3.5	-
23.2	3.4	3.4	2.1	0.8	-	0.9	66.1	0.1	-
7.3	0.1	15.9	9.0	1.2	-	-	64.6	1.9	-

IND. PUP. = INDIVIDUAL PUPIL

MULT. PUP. = MULTIPLE PUPIL

WHL. CLASS = WHOLE CLASS

LESSON 7

LECTURERS :

% TIME									
EMITTER			TARGET			AUDIENCE			O T H E R
IND. PUP.	MULT. PUP.	WHL. CLASS.	IND. PUP.	MULT. PUP.	WHL. CLASS.	IND. PUP.	MULT. PUP.	WHL. CLASS.	
26.07	4.9	13.3	12.0	3.31	-	-	39.1	1.3	0.02
9.5	1.4	34.2	11.7	0.2	-	2.4	15.8	24.8	-
47.2	0.2	11.0	15.8	2.4	-	0.1	22.2	1.1	-
15.1	0.8	33.8	26.6	18.7	0.5	0.5	0.6	3.4	-
17.5	-	45.5	12.3	14.5	0.8	0.1	1.4	7.9	-

IND. PUP. = INDIVIDUAL PUPIL
MULT. PUP. = MULTIPLE PUPIL
WHL. CLASS = WHOLE CLASS

APPENDIX C

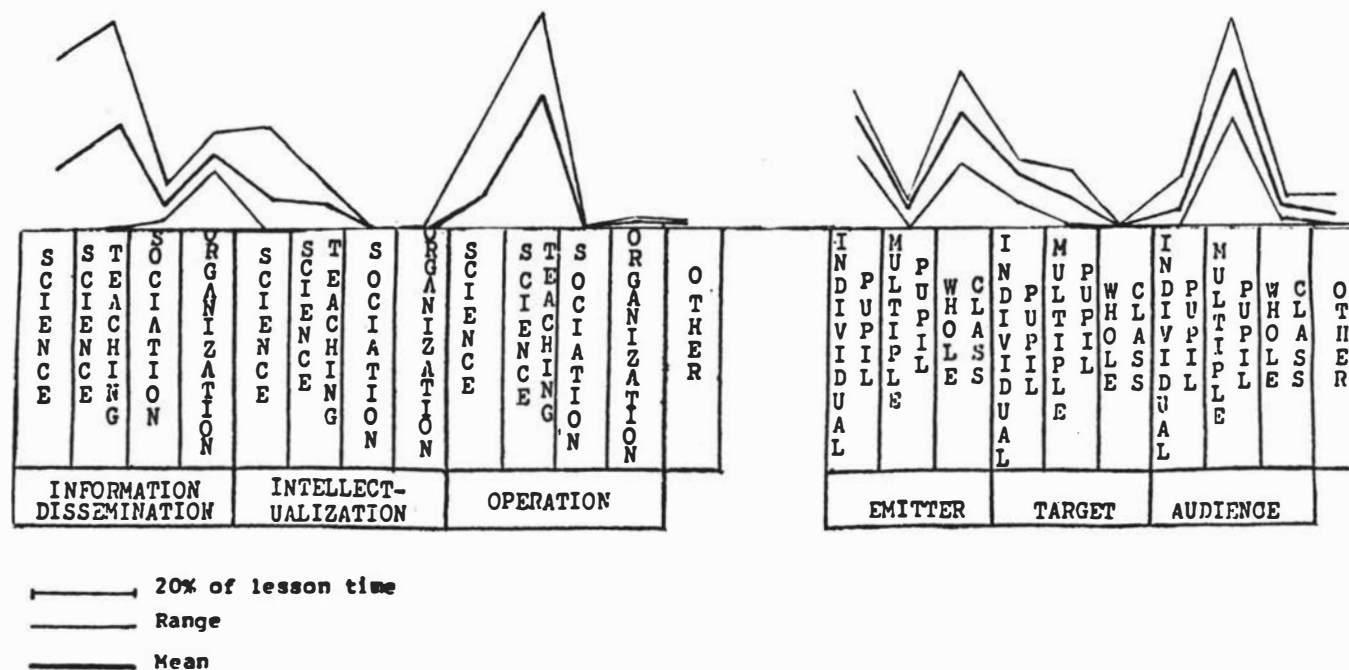
INDIVIDUAL LECTURERS:
RANGES AND MEANS IN
FUNCTIONAL AND STRUCTURAL TRANSACTIONS

APPENDIX C

Actual Transactional Pattern: Lecturer 1

a. Functional Transactions

b. Structural transactions

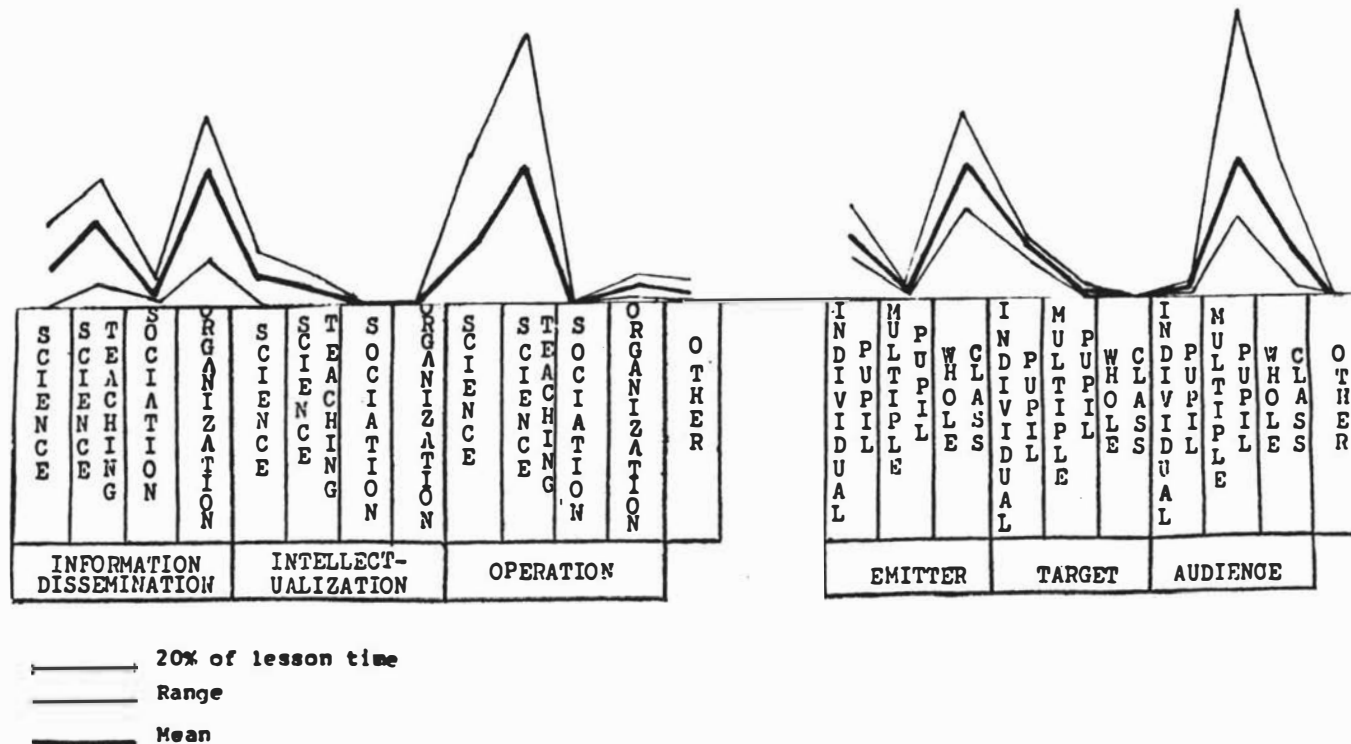


APPENDIX C

Actual Transactional Pattern: Lecturer 2

a. Functional Transactions

b. Structural Transactions

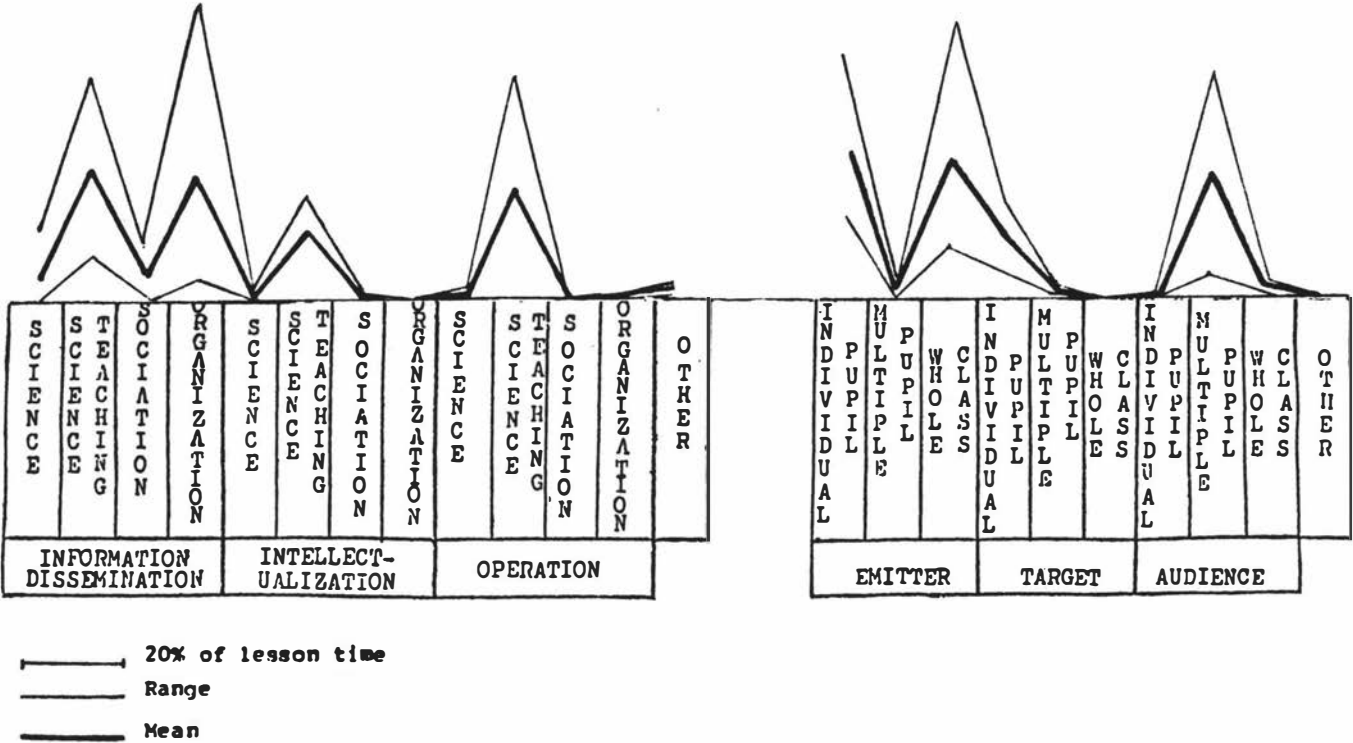


APPENDIX C

Actual Transactional Pattern: Lecturer 3

a. Functional Transactions

b. Structural Transactions

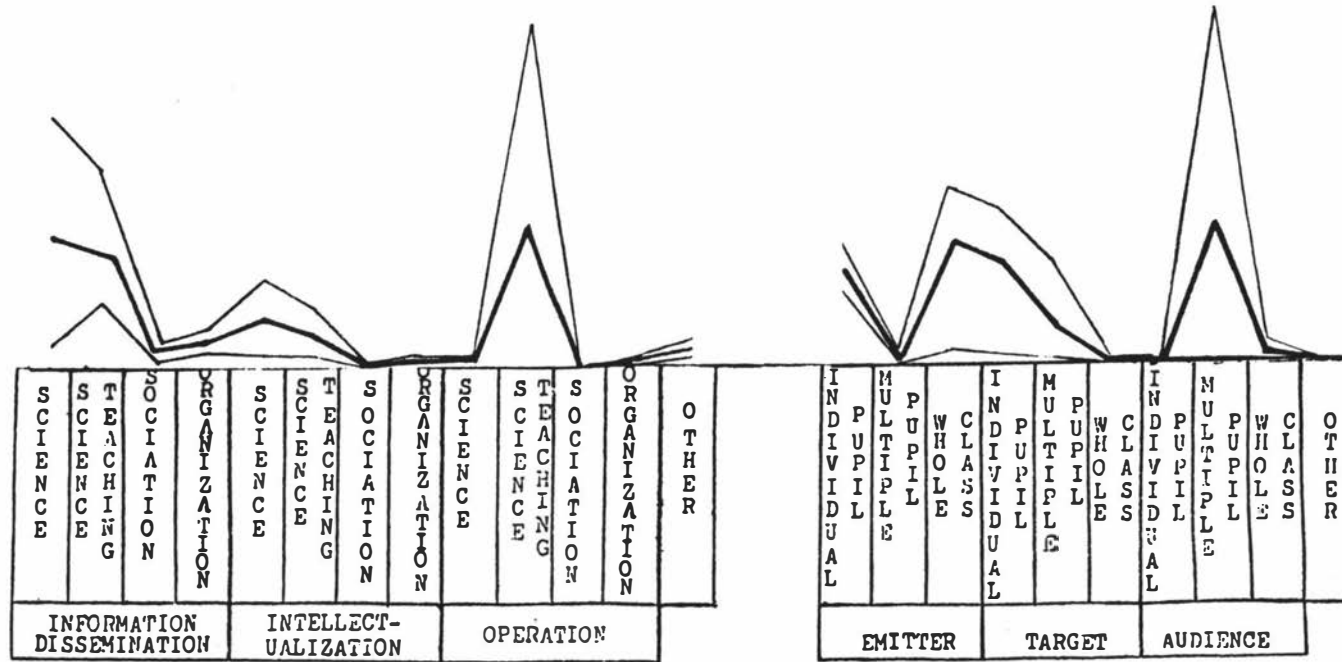


APPENDIX C

Actual Transactional Pattern: Lecturer 4

a. Functional Transactions

b. Structural Transactions

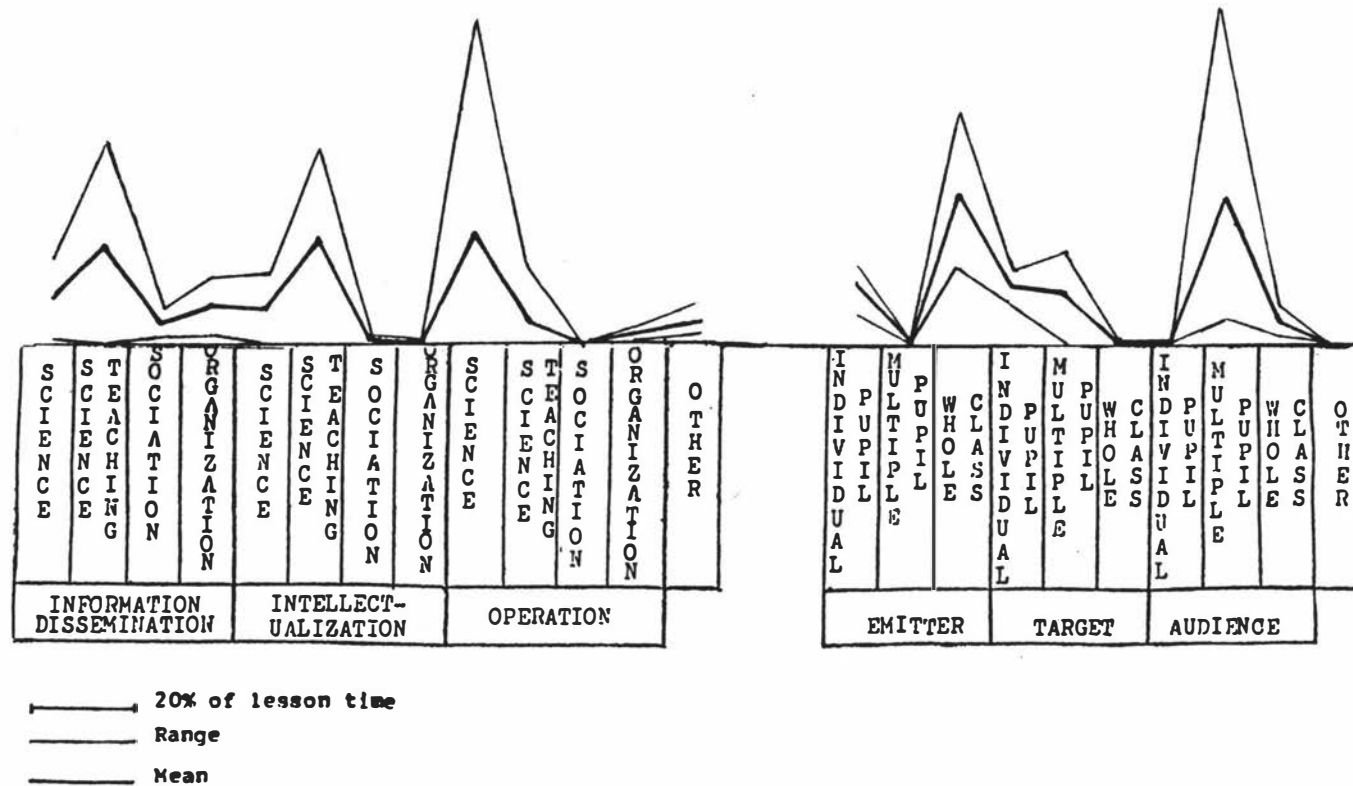


APPENDIX C

Actual Transactional Pattern: Lecturer 5

a. Functional Transactions

b. Structural Transactions



LETTER REQUESTING TEACHER-PARTICIPATION



Massey University

PALMERSTON NORTH, NEW ZEALAND

TELEPHONES, 69-099, 69-089.

In reply please quote:

November 22nd, 1979.

Dear Colleague,

As you are aware, we are trying to investigate some of the problems that new teachers face particularly in Science Teaching, when they go from College to their first appointment.

To continue the study we need to be able to contact some of the present 3rd year students once they have settled into their new schools. We hope you will be willing to participate.

We anticipate that responding to a questionnaire will be involved and, subject to your agreement, an interview or two, and the opportunity to see your science class in action.

It goes without saying that any information that you give us will be treated as confidential and we are able to preserve the anonymity of all who participate.

Could we trouble you then to complete the mini-form below.

Thank you,

Yours sincerely,

Dorothy Gardiner

Tear off - - - - -

Name: _____

School (next year): _____ Address: _____

I am willing to participate in the research project YES ()
NO ()

APPENDIX E.1

FIRST-YEAR TEACHERS: FUNCTIONAL TRANSACTIONS: LESSONS 1 & 3

LESSON 1

% TIME											
INFORMATION DISSEMINATION			INTELLECTUALIZATION			OPERATION			O T H E R		
SC.	SOC.	ORG.	SC.	SOC.	ORG.	SC.	SOC.	ORG.			
TEACHERS: G R O U P 1	1	9.8	2.0	25.6	1.3	-	0.1	55.3	-	2.5	3.4
	2	32.1	8.4	9.3	2.3	-	0.3	33.6	-	2.4	11.6
	3	51.0	5.0	15.1	5.2	-	0.1	20.5	0.1	2.4	0.6
	4	0.5	0.8	13.55	-	-	0.2	82.21	-	2.7	0.04
	5	13.3	6.1	21.8	8.6	-	-	45.6	-	4.4	0.2
	6	18.6	1.1	12.0	3.9	-	-	59.6	-	2.3	2.5
	7	20.5	0.8	20.7	8.3	-	0.2	46.6	-	2.4	0.5
G R O U P 2	8	58.1	1.4	8.3	4.4	-	-	21.0	-	0.3	6.5
	9	14.6	1.3	28.0	0.6	-	0.1	39.3	-	9.1	7.0
	10	24.3	5.7	26.9	0.3	-	0.3	28.9	-	8.4	5.2
	11	21.9	1.4	25.3	3.7	-	-	40.7	-	3.9	3.1
	12	0.5	0.1	11.9	-	-	0.1	80.4	-	6.9	0.1
	13	8.3	1.1	13.6	2.2	-	0.1	59.1	-	13.5	2.1
	14	4.4	1.3	29.6	-	-	0.6	59.9	-	3.6	0.6
	15	41.3	2.3	38.1	9.2	-	-	1.2	-	1.8	6.1
	16	39.3	2.0	24.3	2.3	-	0.1	22.3	-	3.0	6.7
	17	10.61	2.6	17.5	0.37	-	0.1	61.9	-	5.5	1.42
	18	18.6	10.4	31.4	1.2	-	0.3	25.4	-	5.7	7.0
	19	17.5	0.6	15.5	2.6	-	0.1	55.3	-	7.2	1.2
	20	35.3	5.8	15.9	1.0	-	-	30.1	-	8.4	3.5

SC. = SCIENCE
SOC. = SOCIATION
ORG. = ORGANIZATION

APPENDIX E.1: CONTINUED

LESSON 3

% TIME											
INFORMATION DISSEMINATION			INTELLECTUALIZATION			OPERATION			O T H E R		
SC.	SOC.	ORG.	SC.	SOC.	ORG.	SC.	SOC.	ORG.			
TEACHERS: GROUP 1	1	14.8	3.7	25.8	5.8	-	1.2	42.3	-	3.7	2.7
	2	15.3	0.1	9.9	0.2	-	-	67.8	-	6.5	0.2
	3	29.8	3.1	19.9	5.9	-	-	37.1	-	2.4	1.8
	4	1.51	-	10.8	-	-	-	87.21	-	0.14	0.34
	5	6.0	7.8	24.2	-	0.05	0.81	55.0	-	2.6	3.5
	6	30.1	2.4	16.3	5.0	-	0.2	35.0	-	5.3	5.7
	7	30.2	7.8	10.3	6.0	-	-	34.8	-	6.5	4.4
GROUP 2	8	29.9	1.6	15.8	2.9	-	-	42.1	-	2.2	5.5
	9	22.3	4.4	34.3	3.5	-	0.6	24.9	-	9.1	0.9
	10	9.4	5.1	28.5	0.8	0.1	2.5	48.6	-	3.8	1.2
	11	19.9	1.5	25.3	3.6	-	-	33.7	0.1	7.7	8.2
	12	20.0	0.9	30.4	4.1	-	1.0	27.6	-	6.7	9.3
	13	57.9	4.7	1.0	0.7	-	-	35.7	-	-	-
	14	-	-	12.9	-	-	-	84.2	-	1.7	1.2
	15	4.4	1.7	13.7	0.3	-	-	58.4	-	21.4	0.1
	16	27.0	1.3	14.3	11.5	-	0.3	30.6	-	10.9	4.1
	17	3.1	0.3	15.1	0.1	-	-	78.8	-	2.2	0.4
	18	8.7	0.2	16.2	-	-	-	56.8	-	5.5	12.6
	19	22.7	2.27	14.5	2.1	-	0.2	54.4	-	3.5	0.33
	20	52.2	8.0	18.2	3.5	-	0.1	5.2	-	11.5	1.3

SC. = SCIENCE

SOC. = SOCIATION

ORG. = ORGANIZATION

APPENDIX E.2

FIFST-YEAR TEACHEFS: STRUCTUFAL TRANSACTIONS: LESSONS 1 & 3

LESSON 1

% TIME											
EMITTER			TARGET			AUDIENCE			O T H E R		
IND. PUP.	MULT. PUP.	WHL. CLASS	IND. PUP.	MULT. PUP.	WHL. CLASS	IND. PUP.	MULT. PUP.	WHL. CLASS			
TEACHERS :											
G R O U P 1	1	18.8	2.5	7.9	10.0	1.2	-	0.1	57.4	1.4	0.7
	2	6.9	0.7	20.8	7.2	4.0	-	0.6	46.9	0.4	12.5
	3	14.4	3.2	34.9	14.1	5.6	1.2	1.5	15.8	8.8	0.5
	4	6.4	1.03	1.4	3.2	2.83	-	-	85.1	0.04	-
	5	10.5	9.4	16.1	5.2	2.5	1.4	0.5	53.8	0.6	-
	6	9.0	2.0	15.6	6.2	2.0	0.1	0.02	60.7	3.7	0.68
	7	7.1	3.1	29.5	8.1	1.5	-	-	48.0	2.7	-
G R O U P 2	8	8.9	0.1	44.3	11.3	4.5	-	1.0	18.1	11.8	-
	9	11.9	7.8	19.8	8.3	2.9	-	0.3	39.2	5.2	4.6
	10	15.17	3.2	11.4	9.9	7.7	1.05	3.58	39.8	7.6	0.6
	11	12.0	3.86	21.6	9.4	4.1	0.7	0.3	44.5	2.6	0.94
	12	0.6	-	11.0	0.3	0.06	0.1	0.84	86.7	0.4	-
	13	11.9	0.9	4.4	5.8	1.2	0.4	-	72.6	1.0	1.8
	14	7.0	3.6	22.3	2.6	1.2	-	-	61.4	1.9	-
	15	15.3	0.4	48.0	19.3	6.1	0.3	1.0	2.7	6.9	-
	16	17.3	1.0	17.4	16.4	8.7	0.5	1.0	29.6	8.1	-
	17	6.95	0.9	14.5	3.2	1.3	-	0.7	68.8	1.3	2.4
	18	7.9	2.6	29.9	1.6	5.7	4.3	1.6	40.6	5.4	0.4
	19	7.7	2.3	15.1	3.3	4.05	0.13	0.02	66.3	1.1	-
	20	10.7	0.8	24.2	14.1	0.6	-	0.7	42.5	6.4	-

IND. PUP. = INDIVIDUAL PUPIL
MULT. PUP. = MULTIPLE PUPIL
WHL. CLASS = WHOLE CLASS

APPENDIX E.2: CONTINUED

LESSON 3

% TIME											
EMITTER			TARGET			AUDIENCE			O T H E R		
IND. PUP.	MULT. PUP.	WHL. CLASS	IND. PUP.	MULT. PUP.	WHL. CLASS	IND. PUP.	MULT. PUP.	WHL. CLASS			
TEACHERS :											
G R O U P 1	1	15.4	3.1	11.7	13.8	5.2	0.3	0.7	47.4	1.2	1.2
	2	7.2	0.3	11.8	5.4	0.2	-	-	74.9	0.2	-
	3	22.6	2.0	13.3	11.8	6.0	1.4	0.4	36.8	5.7	-
	4	2.9	3.9	1.7	2.0	1.9	-	-	87.2	0.4	-
	5	14.5	6.4	8.3	3.3	1.4	-	-	62.5	3.5	-
	6	10.4	7.2	18.38	12.8	3.6	0.09	0.63	39.2	7.7	-
	7	5.7	3.1	13.2	17.2	2.0	2.6	5.4	41.6	9.2	-
G R O U P 2	8	9.9	0.7	19.8	10.9	3.3	0.1	0.7	48.0	5.9	0.8
	9	10.8	3.8	28.5	8.2	3.7	0.1	0.2	43.3	1.4	-
	10	19.0	2.5	11.1	7.3	2.3	1.2	1.2	53.1	1.8	0.5
	11	12.3	3.2	17.0	6.7	3.6	0.3	0.47	44.8	10.6	1.03
	12	13.5	12.0	13.1	12.9	2.9	-	1.4	35.3	4.7	4.2
	13	1.5	0.2	55.5	1.5	0.5	0.2	-	40.6	-	-
	14	3.7	2.5	6.2	0.6	0.7	-	-	86.0	0.3	-
	15	3.8	3.6	3.1	3.4	0.6	-	0.1	59.5	22.2	3.7
	16	18.3	2.0	10.3	16.2	4.2	-	0.4	41.5	6.2	0.9
	17	0.9	0.2	15.0	1.2	0.3	-	-	81.8	0.6	-
	18	6.6	0.7	7.3	2.9	0.1	-	-	62.5	0.5	19.4
	19	9.0	2.3	16.9	7.8	3.6	0.1	-	60.03	0.27	-
	20	10.8	2.5	29.4	26.1	0.3	-	1.5	23.2	6.2	-

IND. PUP. = INDIVIDUAL PUPIL
MULT. PUP. = MULTIPLE PUPIL
WHL. CLASS = WHOLE CLASS

APPENDIX E.3

TEACHER 16: FUNCTIONAL AND STRUCTURAL TRANSACTIONS: LESSON 2

FUNCTIONAL TRANSACTIONS:

% TIME									
INFORMATION DISSEMINATION			INTELLECTUALIZATION			OPERATION			O T H E R
SC.	SOC.	ORG.	SC.	SOC.	ORG.	SC.	SOC.	ORG.	
0.9	0.1	18.1	-	-	0.1	67.6	-	6.9	6.3

STRUCTURAL TRANSACTIONS:

% TIME									
EMITTER			TARGET			AUDIENCE			O T H E R
IND. PUP.	MULT. PUP.	WHL. CLASS	IND. PUP.	MULT. PUP.	WHL. CLASS	IND. PUP.	MULT. PUP.	WHL. CLASS	
10.0	2.5	3.9	3.2	1.6	-	0.1	75.3	0.9	2.5

APPENDIX F

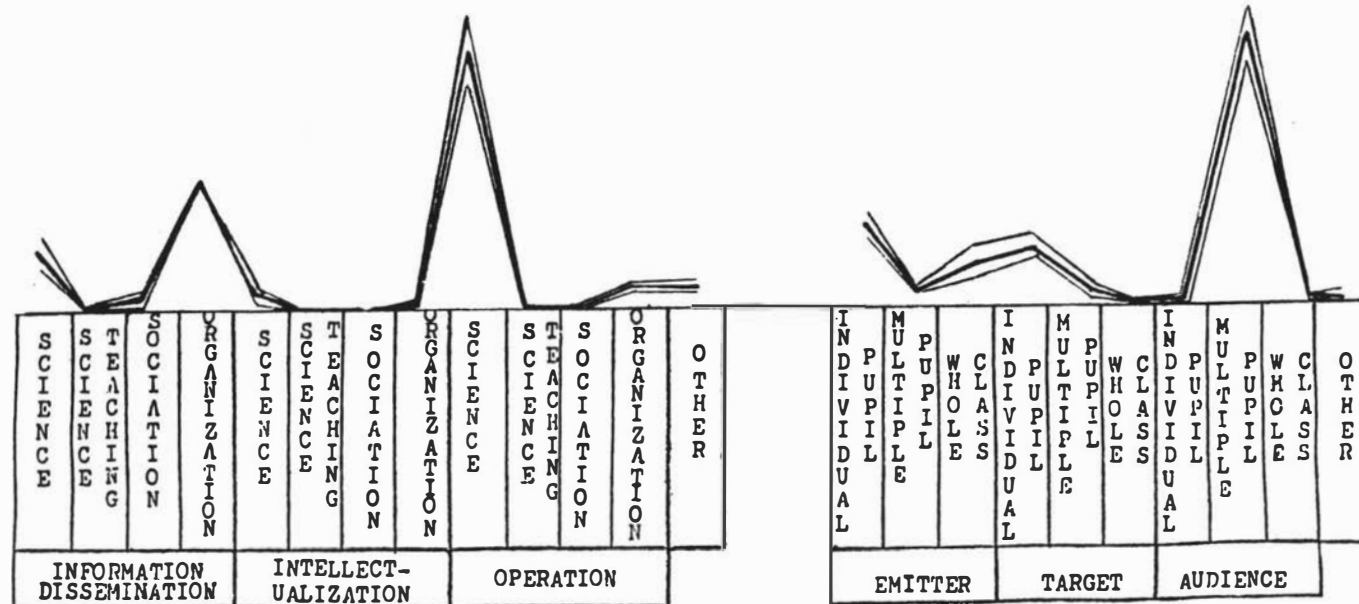
INDIVIDUAL TEACHERS:
RANGES AND MEANS IN
FUNCTIONAL AND STRUCTURAL TRANSACTIONS

APPENDIX F

Actual Transactional Pattern: Teacher 1

a. Functional Transactions

b. Structural Transactions



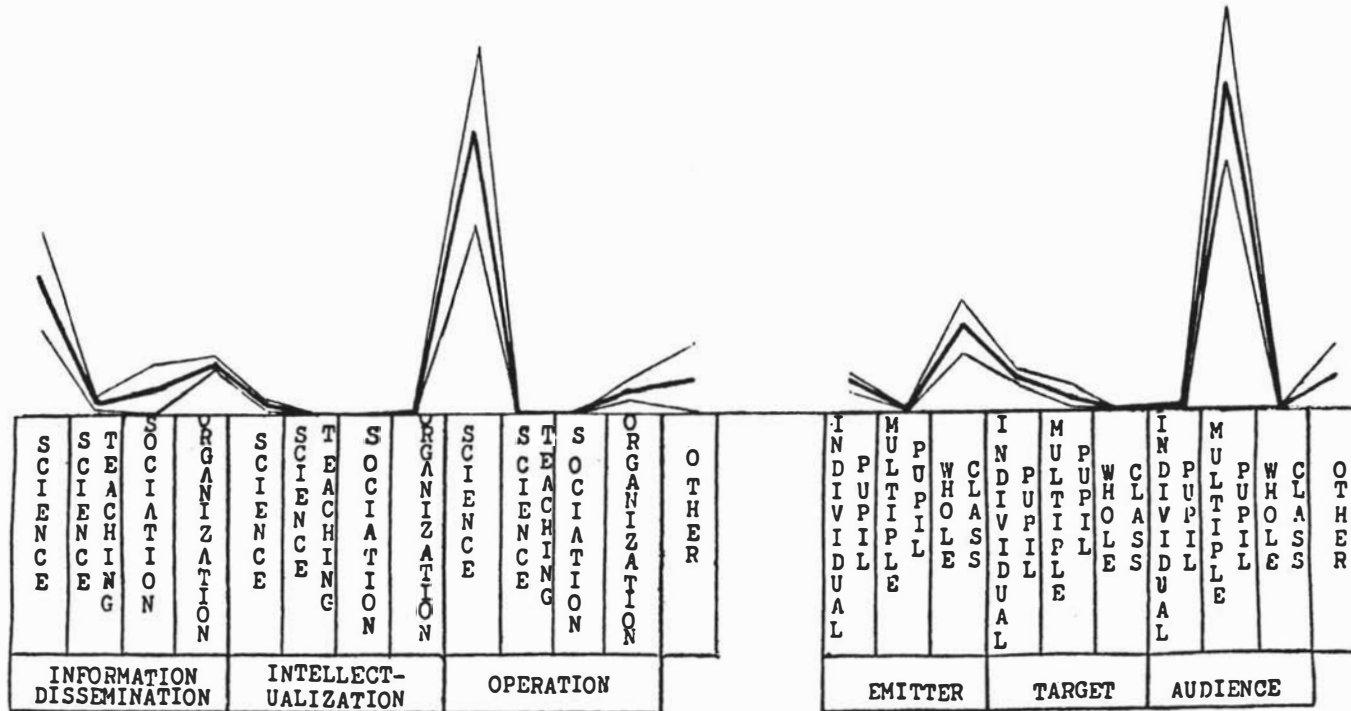
——— 20% of lesson time
 ——— Range
 ——— Mean

APPENDIX F

Actual Transactional Pattern: Teacher 2

a. Functional Transactions

b. Structural Transactions

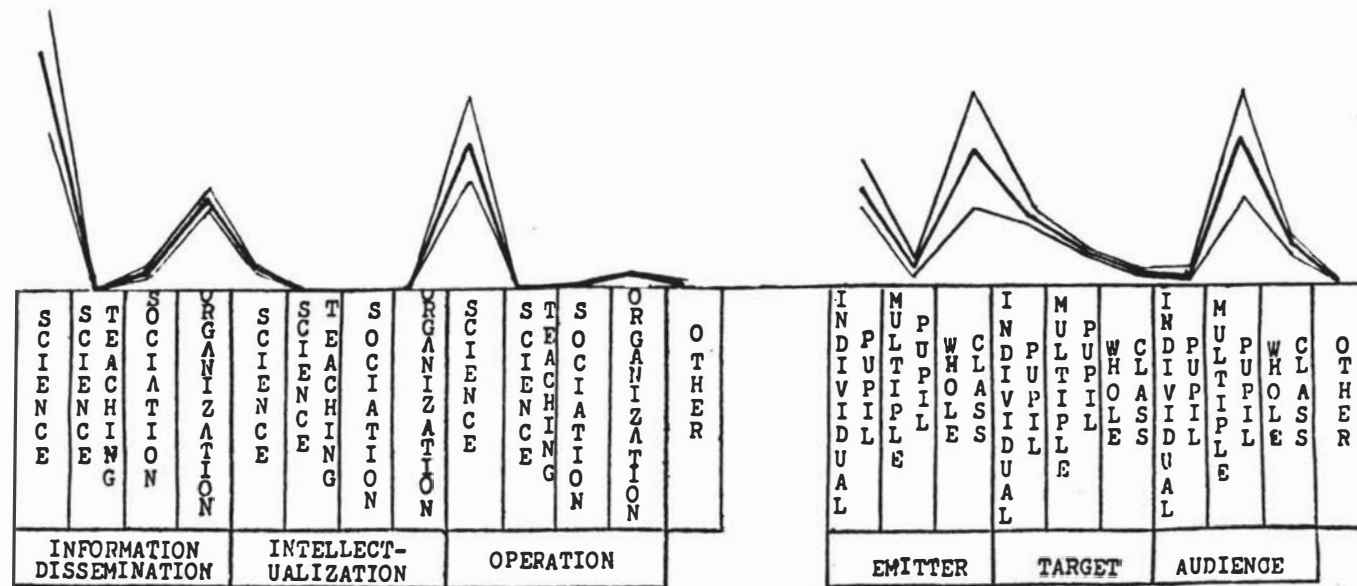


APPENDIX F

Actual Transactional Pattern: Teacher 3

a. Functional Transactions

b. Structural Transactions



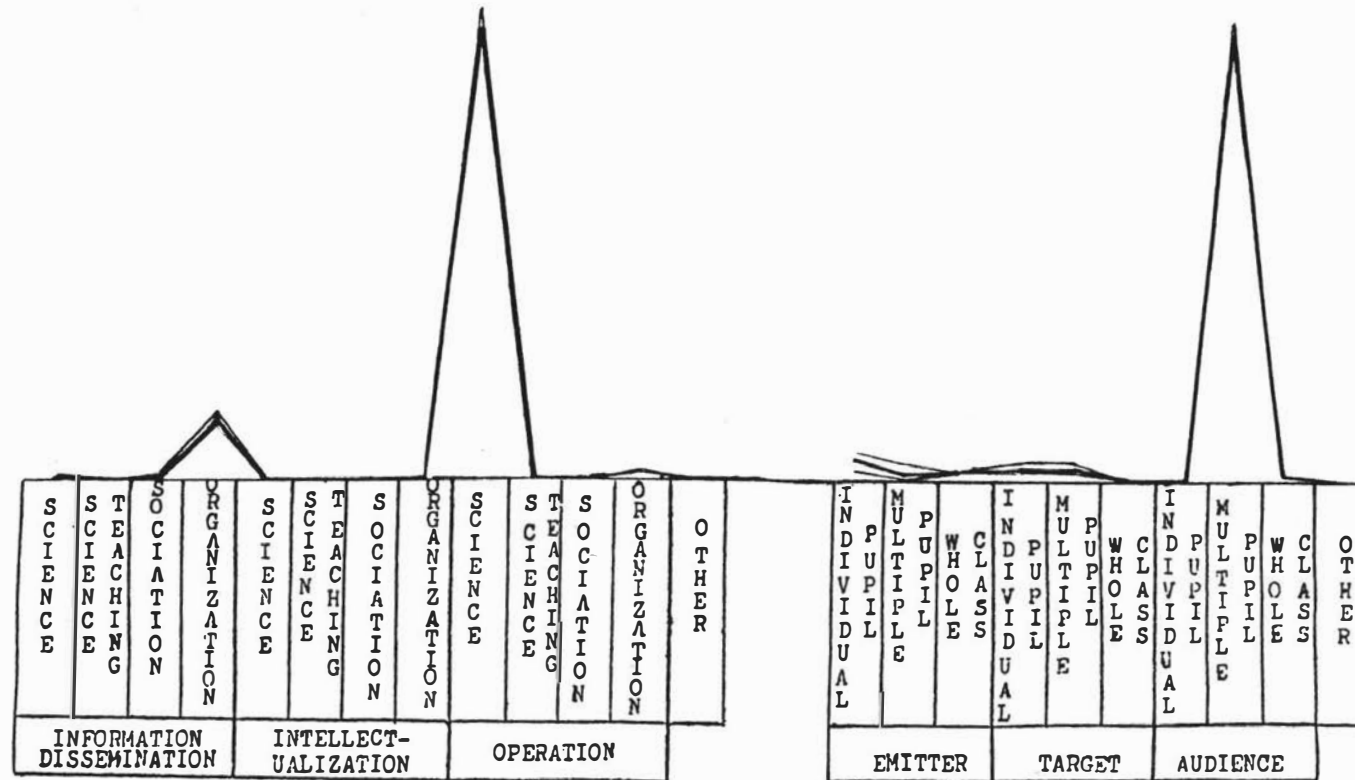
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 4

a. Functional Transactions

b. Structural Transactions



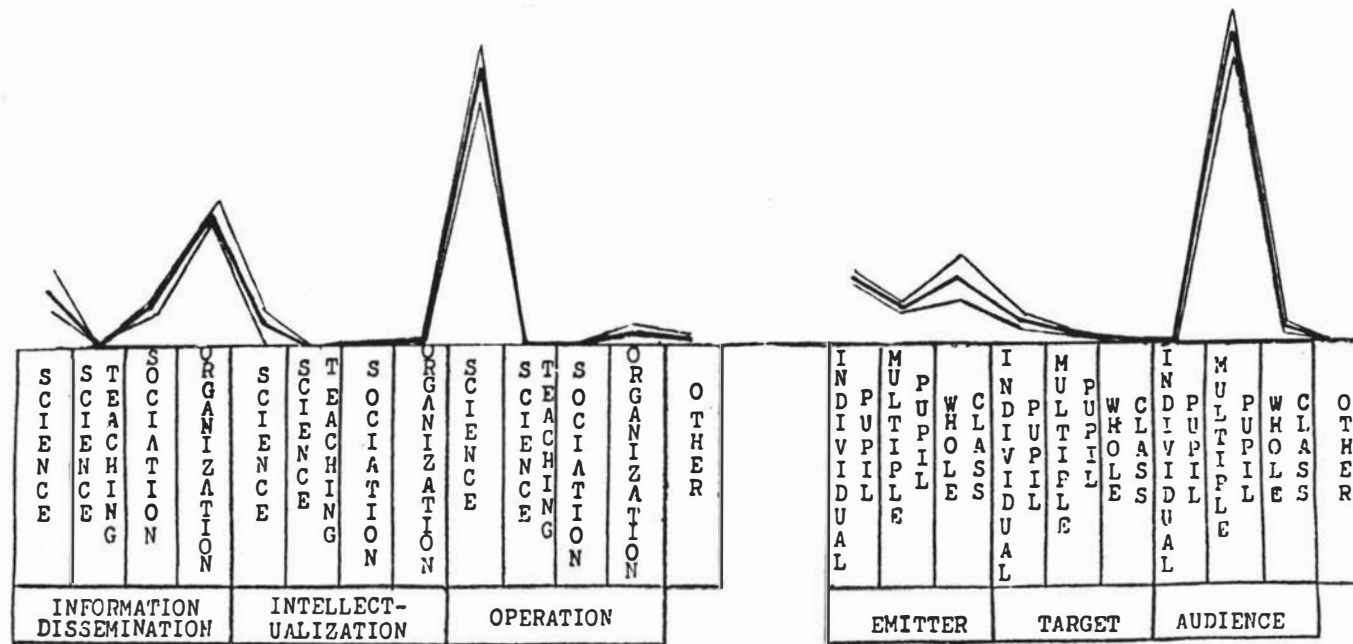
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 5

a. Functional Transactions

b. Structural Transactions



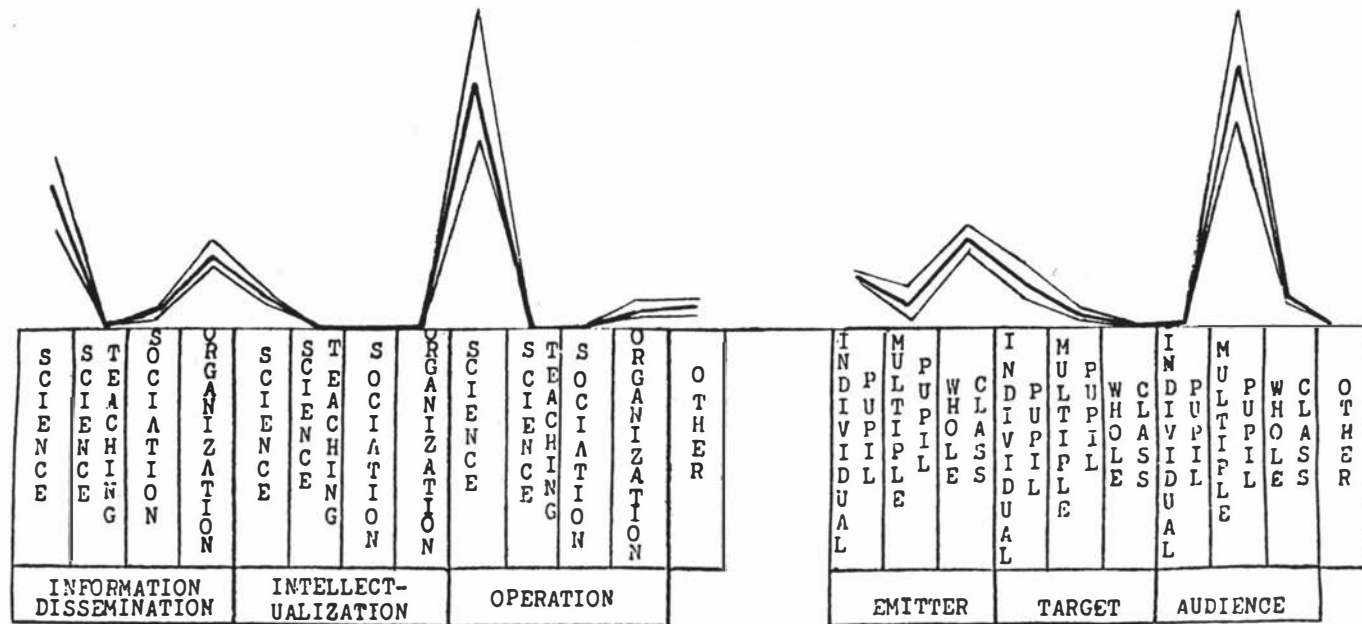
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 6

a. Functional Transactions

b. Structural Transactions



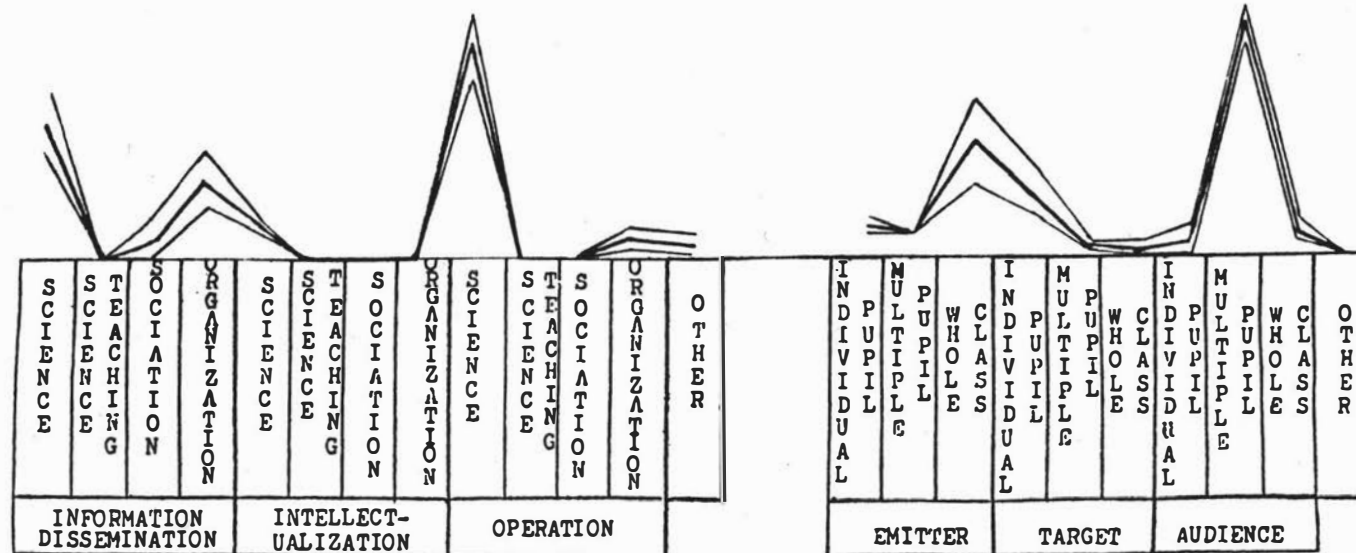
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 7

a. Functional Transactions

b. Structural Transactions



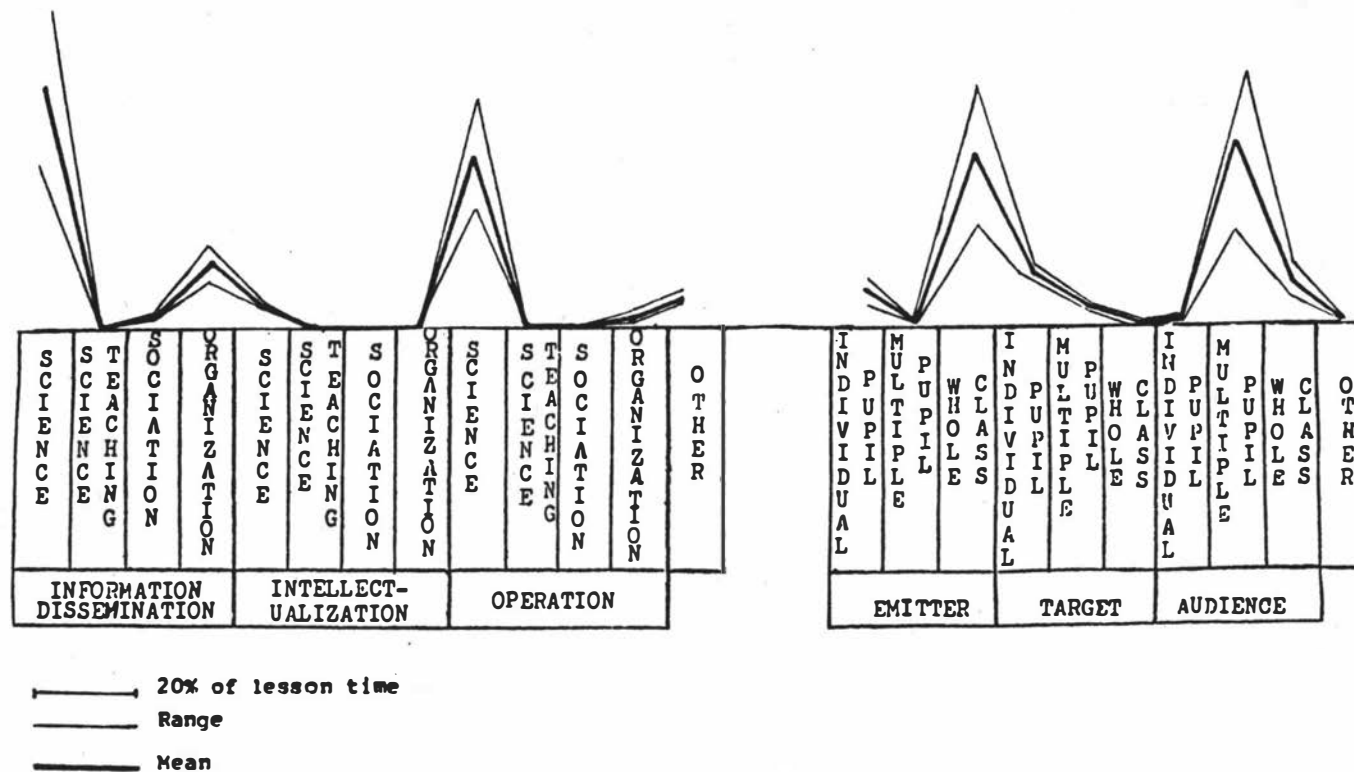
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 8

a. Functional Transactions

b. Structural Transactions

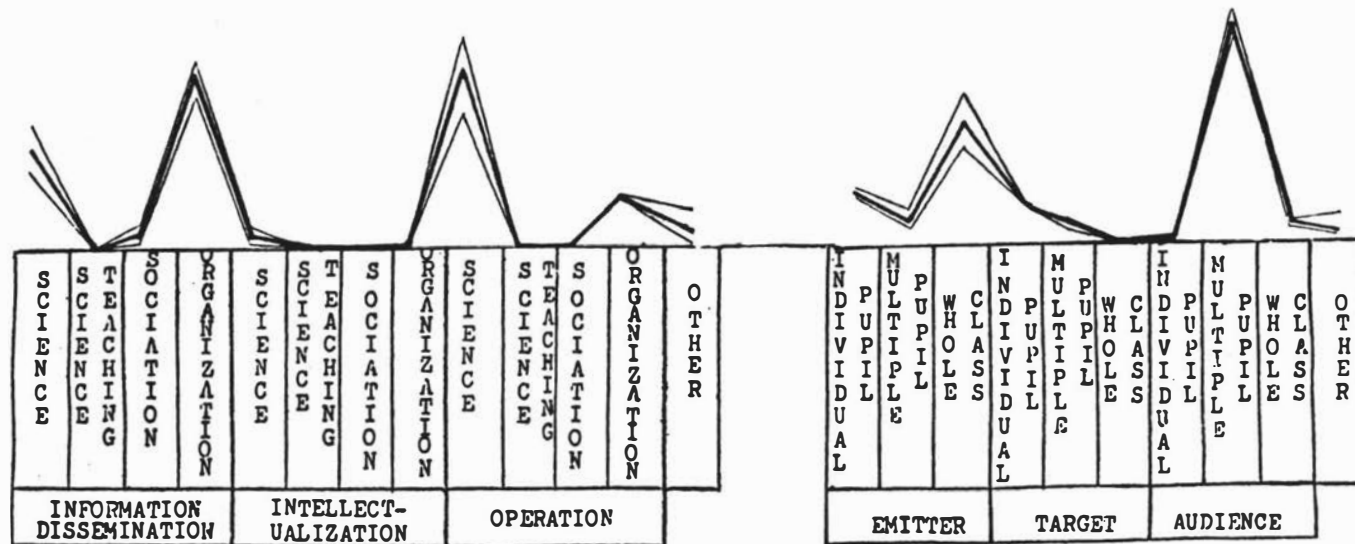


APPENDIX F

Actual Transactional Pattern: Teacher 9

a. Functional Transactions

b. Structural Transactions



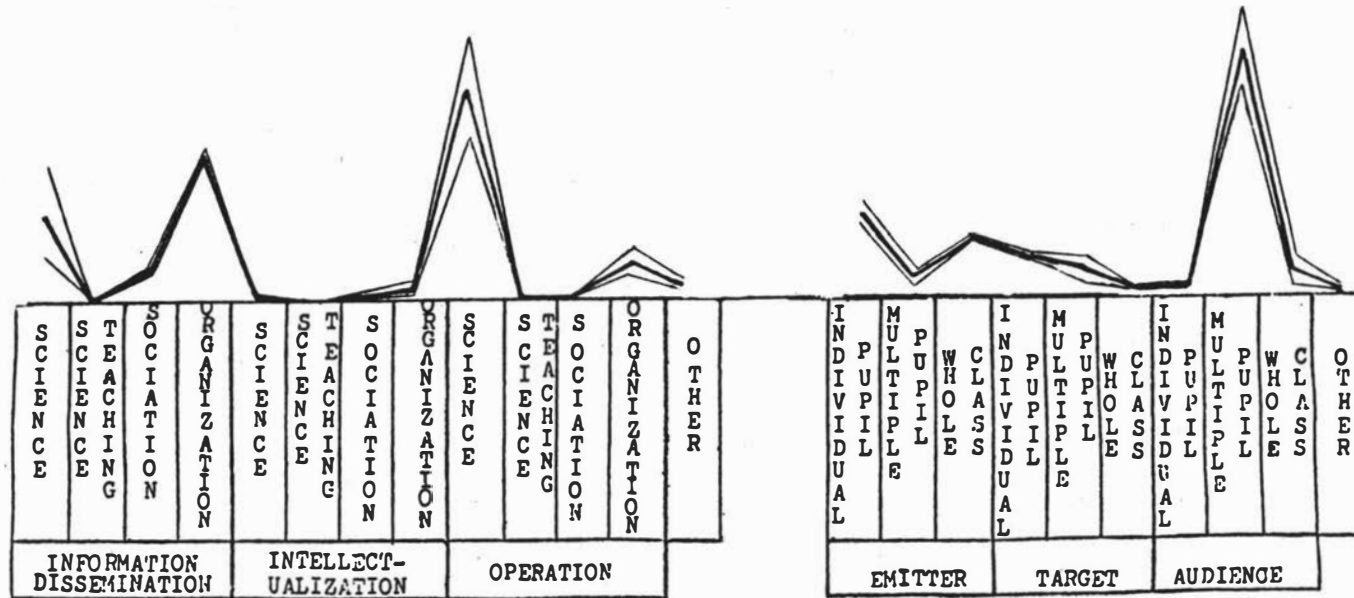
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 10

a. Functional Transactions

b. Structural Transactions

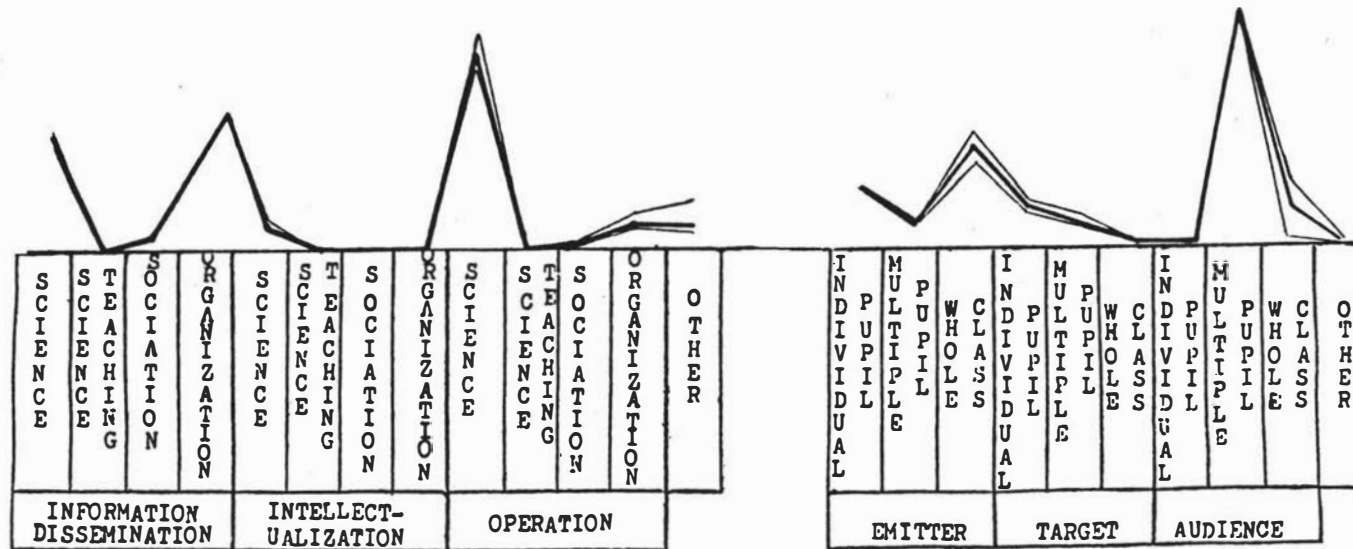


APPENDIX F

Actual Transactional Pattern: Teacher 11

a. Functional Transactions

b. Structural Transactions



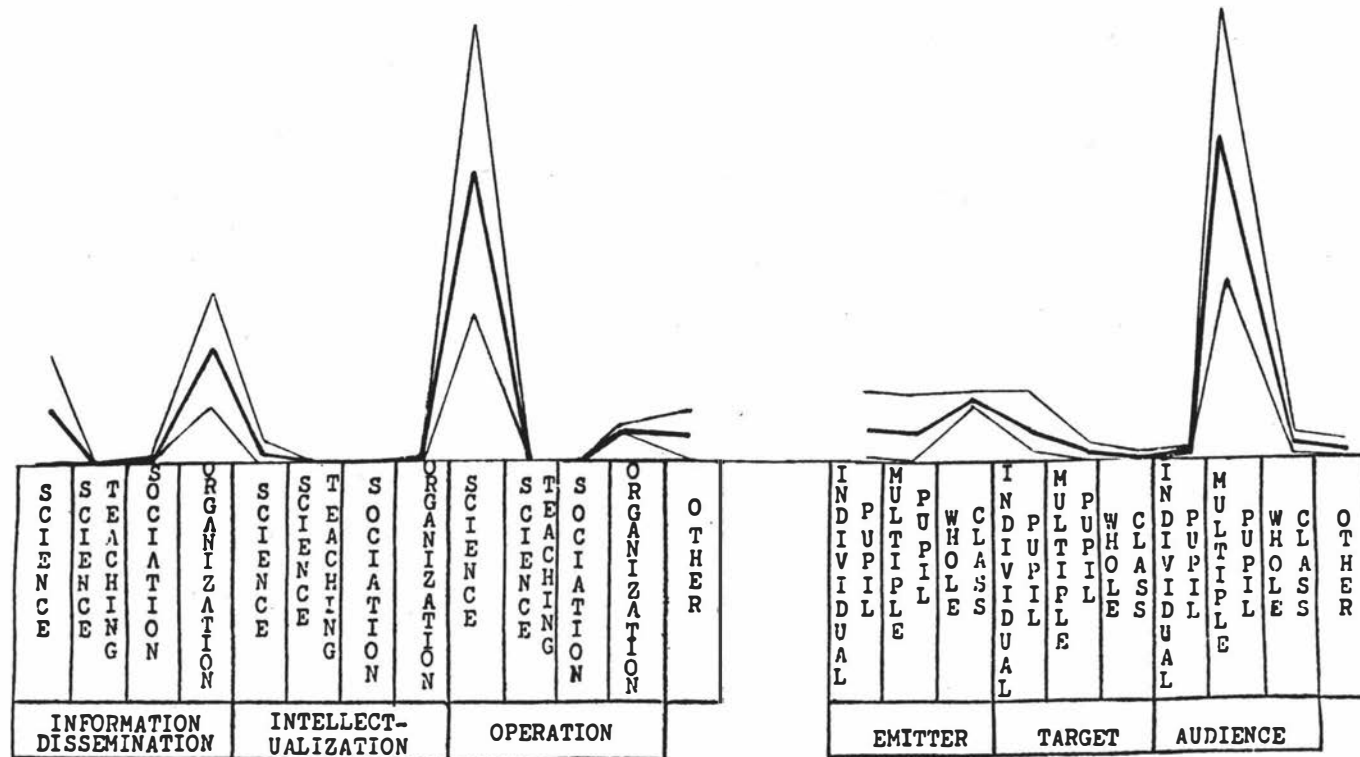
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 12

a. Functional Transactions

b. Structural Transactions



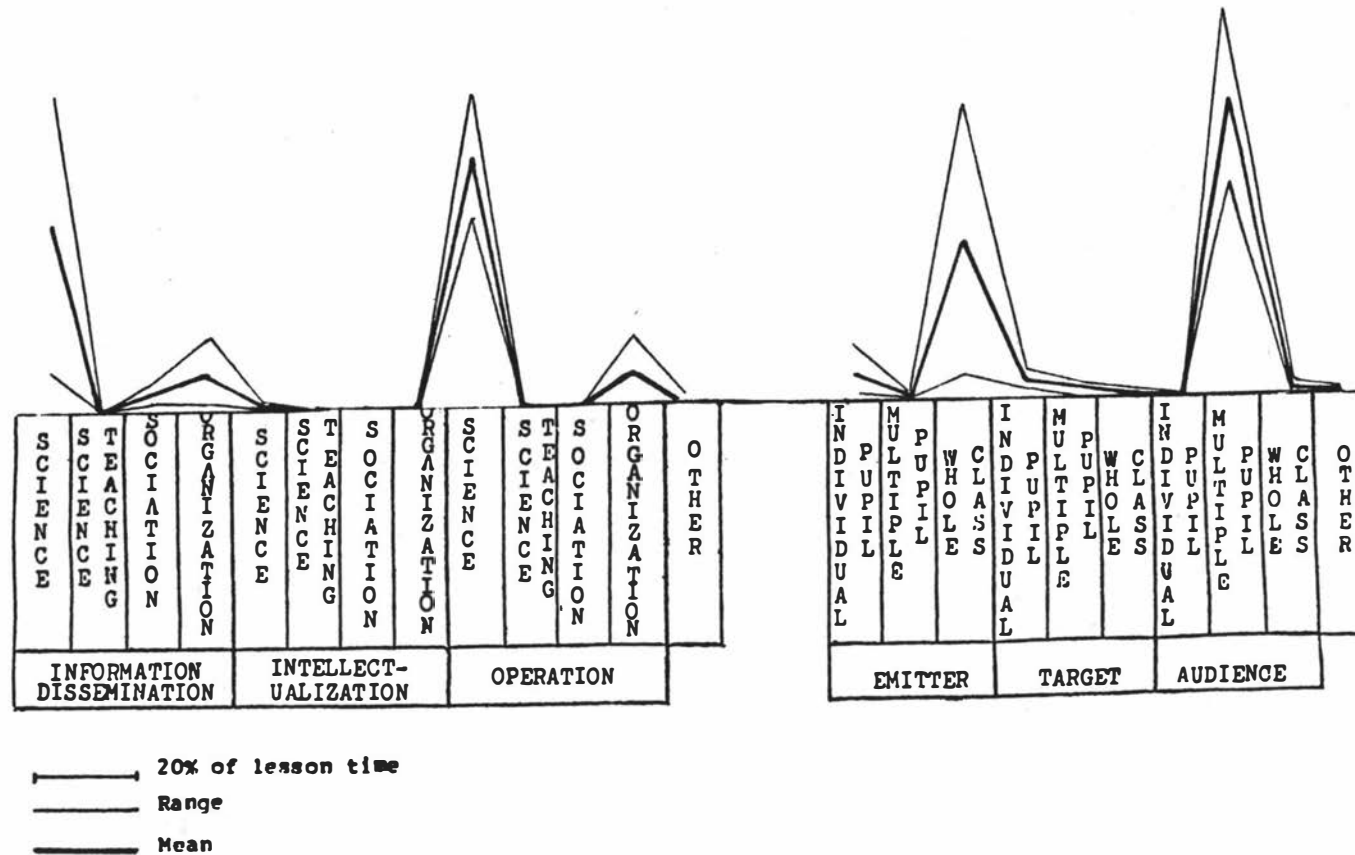
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 13

a. Functional Transactions

b. Structural Transactions

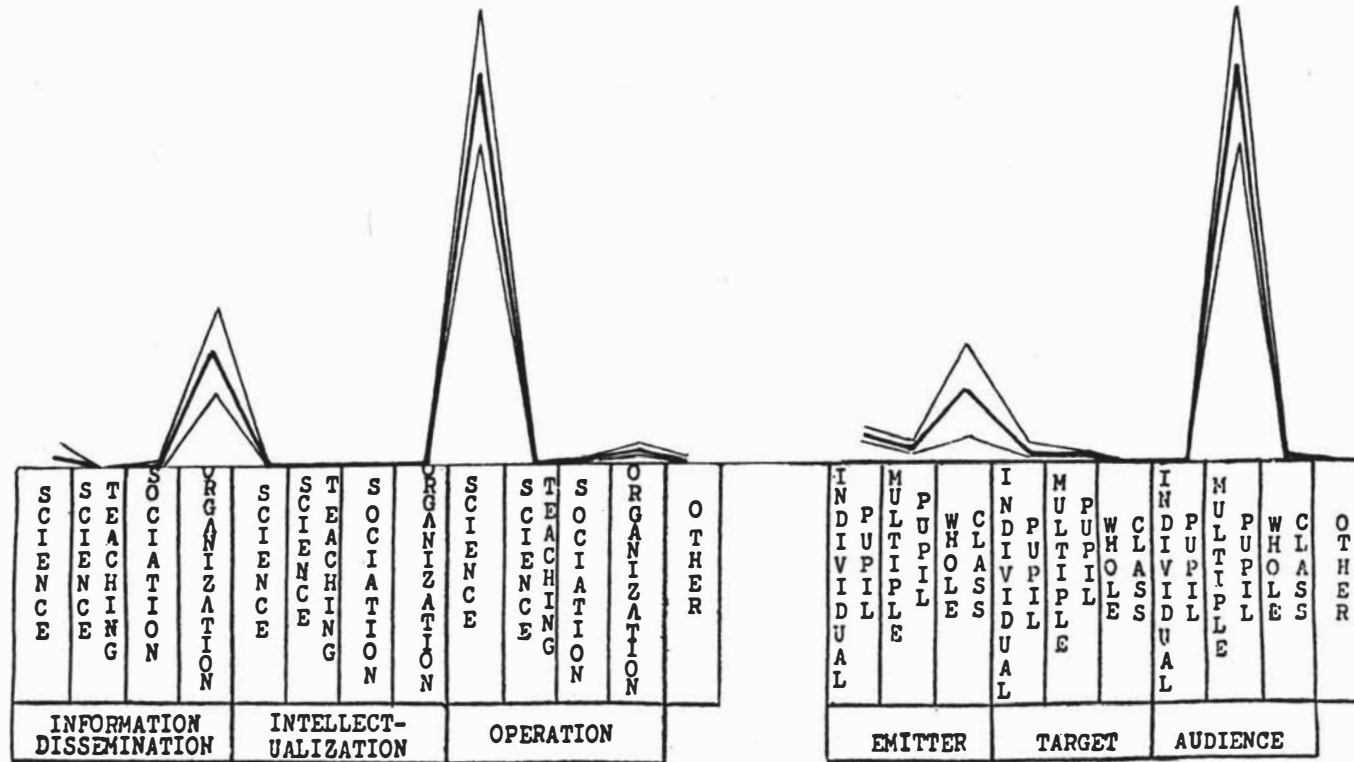


APPENDIX F

Actual Transactional Pattern: Teacher 14

a. Functional Transactions

b. Structural Transactions



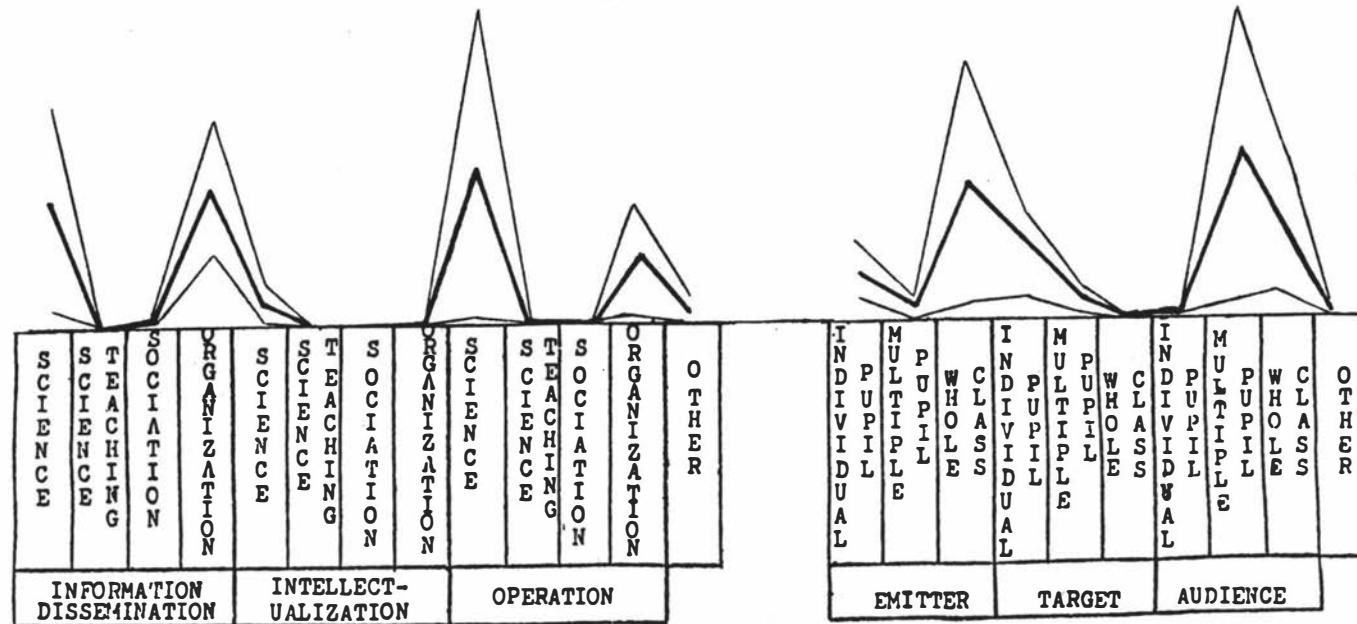
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 15

a. Functional Transactions

b. Structural Transactions



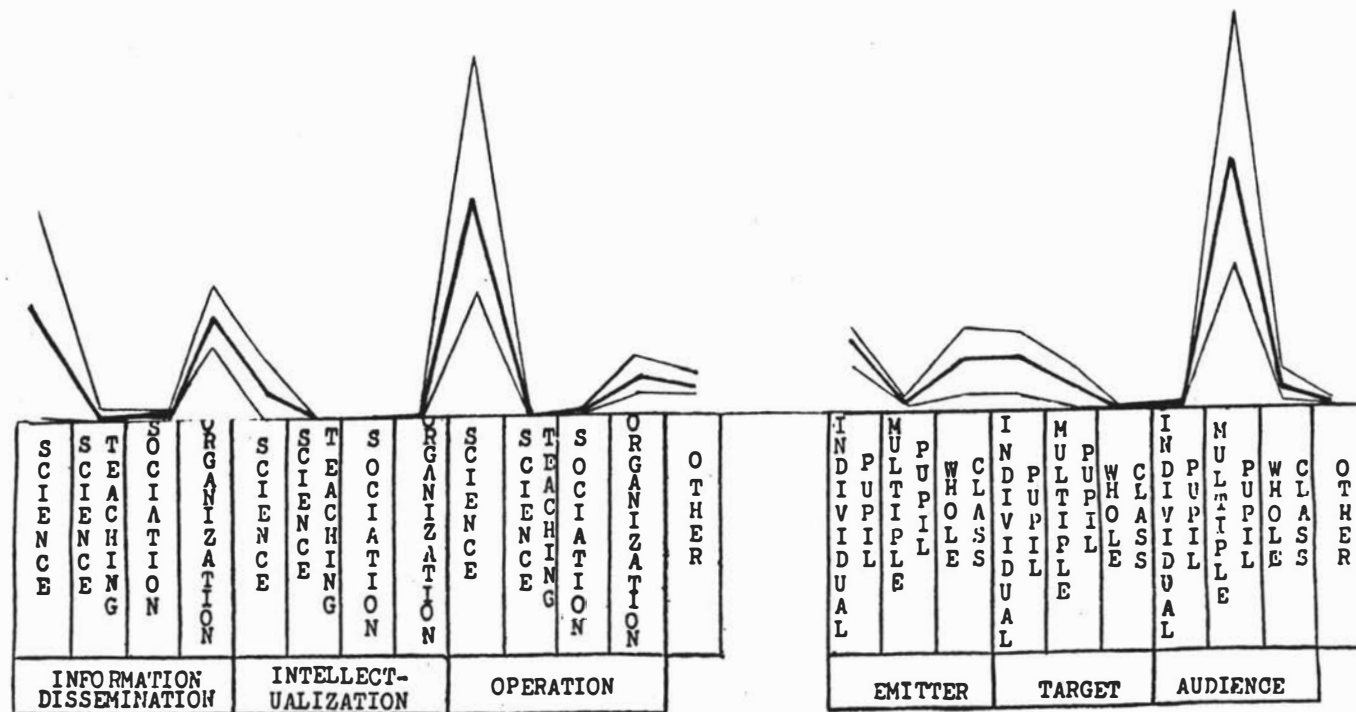
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 16

a. Functional Transactions

b. Structural Transactions

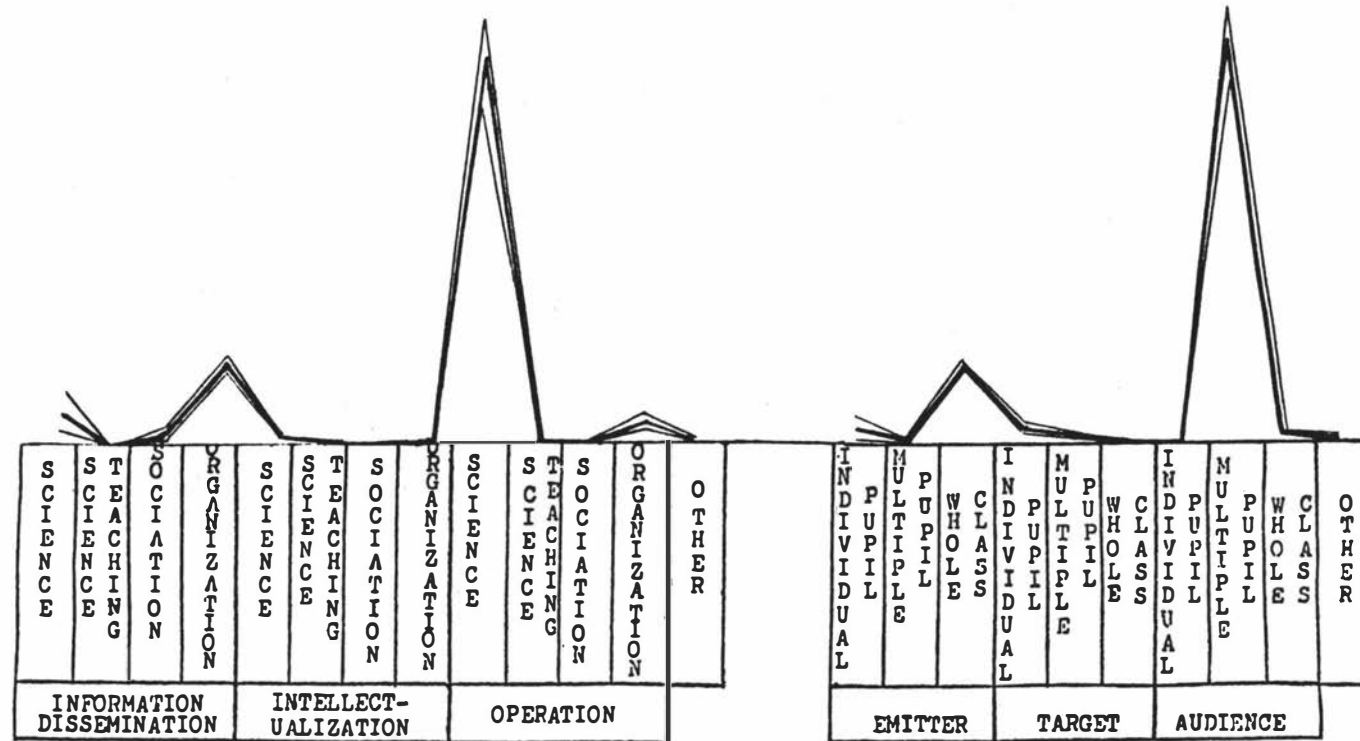


APPENDIX F

Actual Transactional Pattern: Teacher 17

a. Functional Transactions

b. Structural Transactions



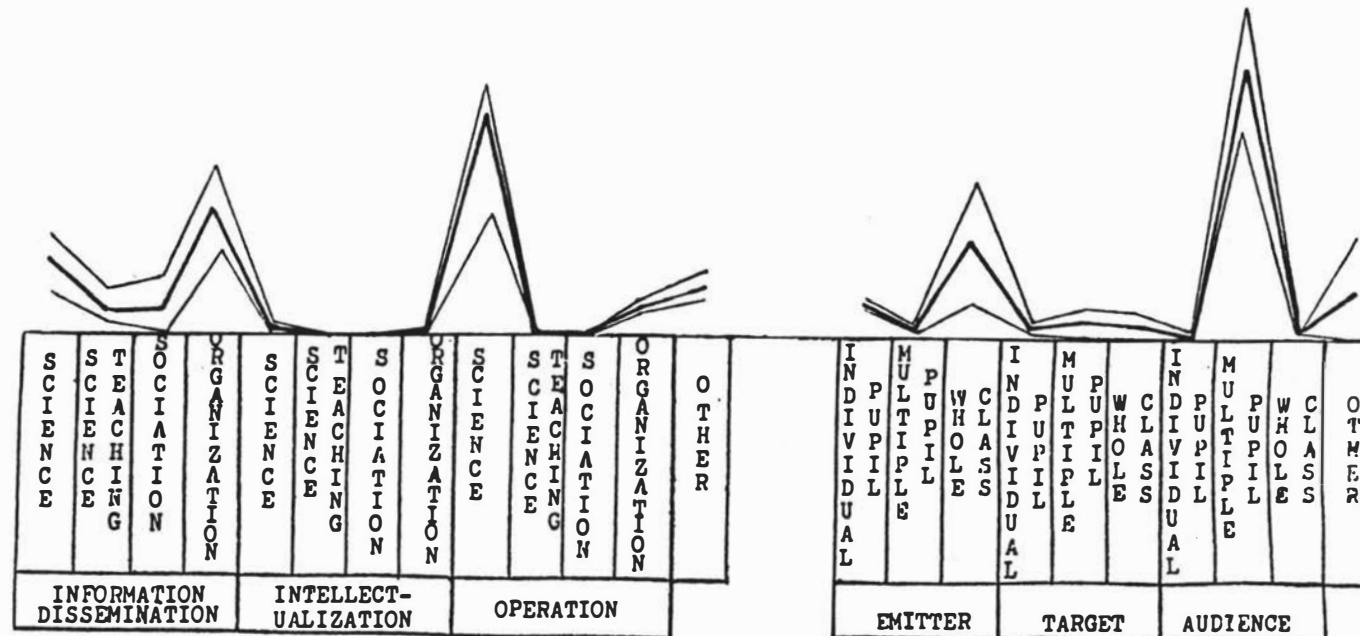
——— 20% of lesson time
 ——— Range
 ——— Mean

APPENDIX F

Actual Transactional Pattern: Teacher 18

a. Functional Transactions

b. Structural Transactions

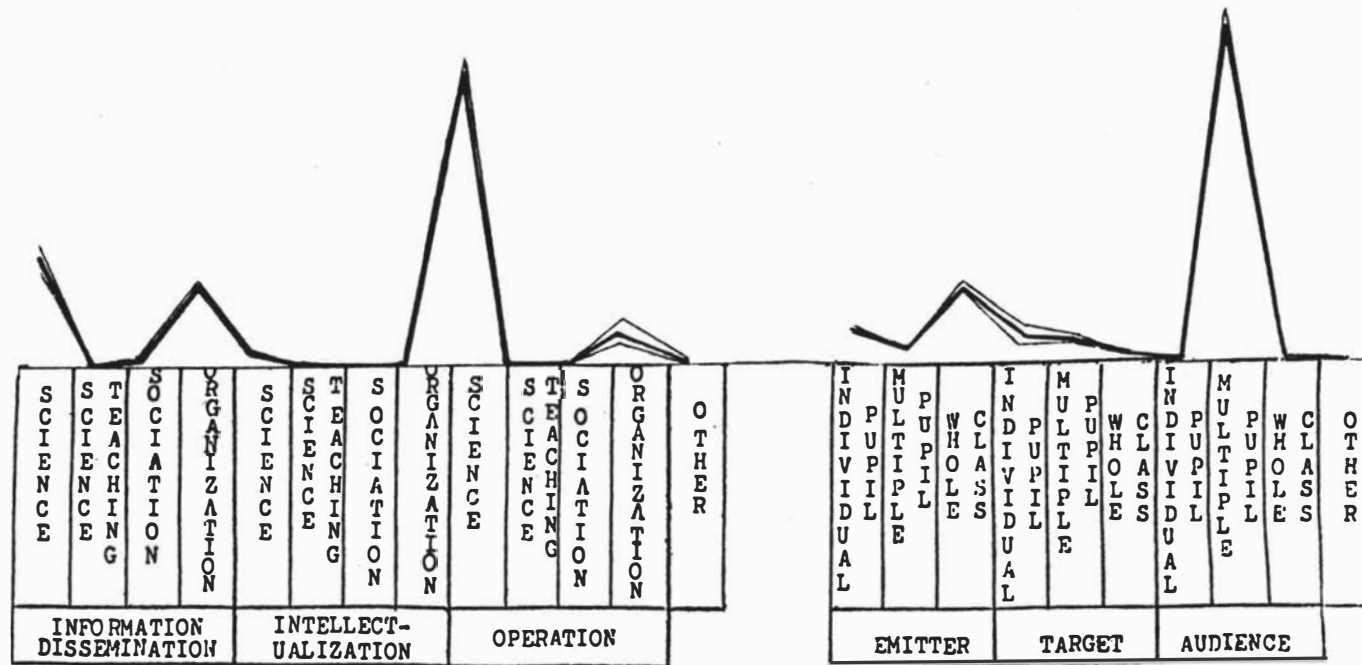


APPENDIX F

Actual Transactional Pattern: Teacher 19

a. Functional Transactions

b. Structural Transactions



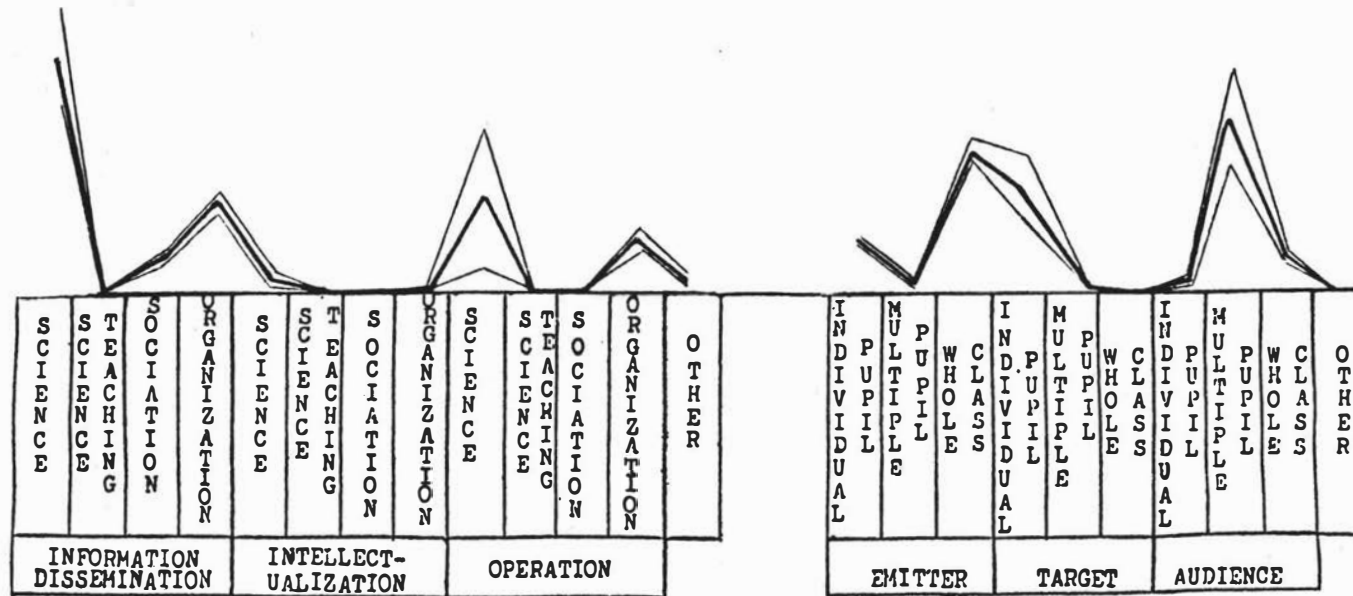
— 20% of lesson time
 — Range
 — Mean

APPENDIX F

Actual Transactional Pattern: Teacher 20

a. Functional Transactions

b. Structural Transactions



— 20% of lesson time
 - - - Range
 . . . Mean

APPENDIX GINTERVIEW SCHEDULES: FIRST-YEAR TEACHERS

The formats of the 4 interviews for the first-year teachers were identical to that used for the College lecturers (Appendix A) with emphasis put on functional and structural transactions. However, in the teachers' case they were asked to indicate the percentages of lesson time which they thought:

- (i) an elementary science teacher should spend on functional and structural transactions;
- (ii) their school science teachers spent on functional and structural transactions;
- (iii) their College lecturers recommended for functional and structural transactions;
- (iv) their College lecturers spent on functional and structural transactions.

In this final case task 1 also included the percentages of lesson time which the teachers thought that their lecturers spent on the functional aspects of science teaching.
(See page following).

APPENDIX G: CONTINUED

Coding sheet for Teacher-perceptions of Lecturers' Functional Transactions

	% of Class Time	Science	Science Teaching	Social Relations	Organization
Giving Information	cell 1	cell 4	cell 5	cell 6	cell 7
Promoting Understanding	cell 2	cell 8	cell 9	cell 10	cell 11
Doing Activities	cell 3	cell 12	cell 13	cell 14	cell 15

APPENDIX H: QUESTIONNAIRE FOR FIRST-YEAR TEACHERS

You have been teaching Science for over a term now and we are interested in how you view your teaching situation.

Consequently, we have designed the following questionnaire in an effort to help us understand how you view your teaching environment, yourself as a new teacher as well as your teaching. We are also interested in some of the problems (if any) that you have faced, or are now facing, during your induction year. Knowledge of these will place us in a better position to help future teachers during their induction year.

SECTION A

This section deals with your expectations when you started teaching, the extent to which you think that you are successful as a science teacher, and the extent to which you think this success (or lack of success) is due to your training for science teaching.

Each question is divided into THREE parts a, b, and c.

Part a deals with the extent of your success at a particular task.

Part b deals with the effect of this success on your general level of success as a science teacher.

Part c deals with the extent to which you think this success (or lack of success) is due to your training for science teaching.

To answer each part of the question you need to tick one number on a five-point scale. The scales for parts a and b are identical but the one for part c is different. The scales are as follows: -

Scale for parts a and b...

Extremely High	High	Average	Not Very Much	Extremely Little
(5)	(4)	(3)	(2)	(1)

Scale for part c...

Entirely	Very Much	Partly	Not Very Much	Extremely Little
(5)	(4)	(3)	(2)	(1)

EXAMPLE:

Compared with your expectations when you started teaching, to what extent have you been successful at:

- 1a. Preparing science ativities? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in preparing science activ- ities influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you con- sider that the degree of your success in preparing science activities is due to your training for science teaching? (5) (4) (3) (2) (1)

Ticking 4 for 1a, 4 for 1b, and 5 for 1c means that you have a HIGH degree of success at preparing science activ-

ities which has a HIGH influence on your general level of success as a science teacher, and your success at preparing science activities is ENTIRELY due to your training for science teaching.

OVERALL QUESTION:

To what extent do you regard yourself successful as a teacher of science?

(Please tick the appropriate number).

Extremely High	High	Average	Low	Extremely Low
(5)	(4)	(3)	(2)	(1)

COMPARED WITH YOUR EXPECTATIONS WHEN YOU STARTED TEACHING, TO WHAT EXTENT HAVE YOU BEEN SUCCESSFUL AT: -

- 1a. Using the prescribed science syllabus?

(5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in using the prescribed science syllabus influence the general level of your success as a science teacher?

(5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in using the prescribed science syllabus is due to your training for science teaching?

(5) (4) (3) (2) (1)
- 2a. Exercising your own judgement over how to use the science syllabus?

(5) (4) (3) (2) (1)

- 2b. To what extent does the degree of your success in exercising your own judgement over how to use the science syllabus influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in exercising your own judgement over how to use the science syllabus is due to your training for science teaching? (5) (4) (3) (2) (1)
- 3a. Getting access to science resource books? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in getting access to science resource books influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in getting access to science resource books is due to your training for science teaching? (5) (4) (3) (2) (1)
- 4a. Using science resource books? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in using science resource books influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in using science resource books is due to your training for science teaching? (5) (4) (3) (2) (1)
- 5a. Getting access to science equipment? (5) (4) (3) (2) (1)

- 5b. To what extent does the degree of your success in getting access to science equipment influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in getting access to science equipment is due to your training for science teaching? (5) (4) (3) (2) (1)
- 6a. Using science equipment? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in using science equipment influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in using science equipment is due to your training for science teaching? (5) (4) (3) (2) (1)
- 7a. Benefitting from collaborating with the Science Resource Teacher? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in benefitting from collaborating with the Science Resource Teacher influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in collaborating with the Science Resource Teacher is due to your training for science teaching? (5) (4) (3) (2) (1)
- 8a. Benefitting from collaborating with the Head of the Science Department? (5) (4) (3) (2) (1)

- 8b. To what extent does the degree of your success at benefitting from collaborating with the Head of the Science Department influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success at benefitting from collaborating with the Head of the Science Department is due to your training for science teaching? (5) (4) (3) (2) (1)
- 9a. Adapting the classroom environment in the interest of science teaching? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in adapting the classroom environment in the interest of science teaching influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in adapting the classroom in the interest of science teaching is due to your training for science teaching? (5) (4) (3) (2) (1)
- 10a. Organizing pupils during science lessons? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in organizing pupils during science lessons influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in organizing pupils during science lessons is due to your training for science teaching? (5) (4) (3) (2) (1)

- 11a. Controlling pupils during science lessons? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in controlling pupils during science lessons influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in controlling pupils during science lessons is due to your training for science teaching? (5) (4) (3) (2) (1)
- 12a. Getting pupils to observe safety rules during science activities? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in getting pupils to observe safety rules during science activities influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in getting pupils to observe safety rules during science activities is due to your training for science teaching? (5) (4) (3) (2) (1)
- 13a. Planning your science programme? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in planning your science programme influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in planning your science programme is due to your training for science teaching? (5) (4) (3) (2) (1)

- | | | | | | |
|---|-----|-----|-----|-----|-----|
| 14a. Extending the science programme beyond the classroom? | (5) | (4) | (3) | (2) | (1) |
| b. To what extent does the degree of your success in extending the science programme beyond the classroom influence the general level of your success as a science teacher? | (5) | (4) | (3) | (2) | (1) |
| c. To what extent do you consider that the degree of your success in extending the science programme beyond the classroom is due to your training for science teaching? | (5) | (4) | (3) | (2) | (1) |
| 15a. Devising objectives for science lessons? | (5) | (4) | (3) | (2) | (1) |
| b. To what extent does the degree of your success in devising objectives for your science lessons influence the general level of your success as a science teacher? | (5) | (4) | (3) | (2) | (1) |
| c. To what extent do you consider that the degree of your success in devising objectives for your science lessons is due to your training for science teaching? | (5) | (4) | (3) | (2) | (1) |
| 16a. Preparing science activities? | (5) | (4) | (3) | (2) | (1) |
| b. To what extent does the degree of your success in preparing science activities influence the general level of your success as a science teacher? | (5) | (4) | (3) | (2) | (1) |
| c. To what extent do you consider that the degree of your success in preparing science activities is due to your training for science teaching? | (5) | (4) | (3) | (2) | (1) |
| 17a. Devising open-ended problems for your science class? | (5) | (4) | (3) | (2) | (1) |

- 17b. To what extent does the degree of your success in devising open-ended problems for your science class influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in devising open-ended problems for your science class is due to your training for science teaching? (5) (4) (3) (2) (1)
- 18a. Modifying materials to suit specific class needs or science activities? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in modifying materials to suit specific class needs or science activities influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in modifying materials to suit specific class needs or science activities is due to your training for science teaching? (5) (4) (3) (2) (1)
- 19a. Integrating science with other subjects? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in integrating science with other subjects influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in integrating science with other subjects is due to your training for science teaching? (5) (4) (3) (2) (1)

- 20a. Exercising your own judgement over how to teach science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in exercising your own judgement over how to teach science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in exercising your own judgement over how to teach science is due to your training for science teaching? (5) (4) (3) (2) (1)
- 21a. Using the science teaching kit you prepared at Teacher's College? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in using this science teaching kit influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in using this science teaching kit is due to your training for science teaching? (5) (4) (3) (2) (1)
- 22a. Motivating your pupils to learn science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in motivating your pupils to learn science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in motivating your pupils to learn science is due to your training for science teaching? (5) (4) (3) (2) (1)

- 23a. Increasing your pupil's knowledge of science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in increasing your pupil's knowledge of science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in increasing your pupil's knowledge of science is due to your training for science teaching? (5) (4) (3) (2) (1)
- 24a. Helping your pupils to develop concepts in science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in helping your pupils to develop concepts in science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in helping your pupils to develop concepts in science is due to your training for science teaching? (5) (4) (3) (2) (1)
- 25a. Developing your pupils' communication skills in science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in developing your pupils' communication skills in science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in developing your pupils' communication skills is due to your training for science teaching? (5) (4) (3) (2) (1)

- | | | | | | |
|--|-----|-----|-----|-----|-----|
| 26a. Teaching your pupils to observe? | (5) | (4) | (3) | (2) | (1) |
| b. To what extent does the degree of your success in teaching your pupils to observe influence the general level of your success as a science teacher? | (5) | (4) | (3) | (2) | (1) |
| c. To what extent do you consider that the degree of your success in teaching your pupils to observe is due to your training for science teaching? | (5) | (4) | (3) | (2) | (1) |
| 27a. Teaching your pupils to measure? | (5) | (4) | (3) | (2) | (1) |
| b. To what extent does the degree of your success in teaching your pupils to measure influence the general level of your success as a science teacher? | (5) | (4) | (3) | (2) | (1) |
| c. To what extent do you consider that the degree of your success in teaching your pupils to measure is due to your training for science teaching? | (5) | (4) | (3) | (2) | (1) |
| 28a. Teaching your pupils to classify? | (5) | (4) | (3) | (2) | (1) |
| b. To what extent does the degree of your success in teaching children to classify influence the general level of your success as a science teacher? | (5) | (4) | (3) | (2) | (1) |
| c. To what extent do you consider that the degree of your success in teaching your pupils to classify is due to your training for science teaching? | (5) | (4) | (3) | (2) | (1) |
| 29a. Teaching your pupils to infer? | (5) | (4) | (3) | (2) | (1) |

- 29b. To what extent does the degree of your success in teaching your pupils to infer influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in teaching your pupils to infer is due to your training for science teaching? (5) (4) (3) (2) (1)
- 30a. Teaching your pupils to predict results? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in teaching your pupils to predict results influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in teaching your pupils to predict results is due to your training for science teaching? (5) (4) (3) (2) (1)
- 31a. Teaching your pupils to hypothesize? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in teaching your pupils to hypothesize influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in teaching your pupils to hypothesize is due to your training for science teaching? (5) (4) (3) (2) (1)
- 32a. Teaching your pupils to experiment? (5) (4) (3) (2) (1)

- 32b. To what extent does the degree of your success in teaching your pupils to experiment influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in teaching your pupils to experiment is due to your training for science teaching? (5) (4) (3) (2) (1)
- 33a. Increasing your pupils' understanding of science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in increasing your pupils' understanding of science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in increasing your pupils' understanding of science is due to your training for science teaching? (5) (4) (3) (2) (1)
- 34a. Developing desirable attitudes in your pupils during your science lessons? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in developing desirable attitudes in your pupils during your science lessons influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in developing desirable attitudes in your pupils during your science lessons is due to your training for science teaching? (5) (4) (3) (2) (1)

- 35a. Preparing testing and evaluation instruments for the pupils in your science class? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in preparing these instruments influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in preparing these instruments is due to your training for science teaching? (5) (4) (3) (2) (1)
- 36a. Evaluating the acquisition of process skills by the members of your science class? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in evaluating the acquisition of process skills by the members of your science class influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in evaluating the acquisition of process skills by members of your science class is due to your training for science teaching? (5) (4) (3) (2) (1)
- 37a. Evaluating the increase of knowledge and understanding of science in your pupils? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in evaluating the increase of knowledge and understanding in your pupils influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in evaluating the increase of knowledge and understanding of science in your pupils is due to your training for science teaching? (5) (4) (3) (2) (1)

- 38a. Evaluating the increase of communication skills in your pupils? (5) (4) (3) (2) (1)
- b. To what extent does the degree of success in evaluating the increase of communication skills in your pupils influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in evaluating the increase of communication skills in your pupils is due to your training for science teaching? (5) (4) (3) (2) (1)
- 39a. Evaluating the increase of desirable attitudes in your pupils? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in evaluating the increase of desirable attitudes in your pupils influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in evaluating the increase of desirable attitudes in your pupils is due to your training for science teaching? (5) (4) (3) (2) (1)
- 40a. Writing progress reports for the members of your science class? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your success in writing progress reports for the members of your science class influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your success in writing progress reports for the members of your science class is due to your training for science teaching? (5) (4) (3) (2) (1)

SECTION B

This section deals with your own ratings of some aspects of science teaching.

As in Section A, each question is divided into three parts. The first part deals with your rating of the category in point. The second part deals with the extent to which this category influences the general level of your teaching, and the third part deals with the extent to which this category is due to your training for science teaching.

As in Section A you also need to tick a number on a five-point scale to indicate your answer. The three scales for Section B are identical to those of Section A: -

Scale for parts a and b....

Extremely High	High	Average	Low	Extremely Low
(5)	(4)	(3)	(2)	(1)

Scale for part c....

Entirely	Very Much	Partly	Not very much	Extremely Little
(5)	(4)	(3)	(2)	(1)

EXAMPLE:

Under present conditions, how would you rate:

1a. Your motivation to teach science? (5) ☒ (4) (3) (2) (1)

- 1b. To what extent does the degree of your motivation to teach science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your motivation to teach science is due to your training for science teaching? (5) (4) (3) (2) (1)

Ticking 4 for 1a, 5 for 1b and and 3 for 1c means that you have a HIGH degree of motivation to teach science which has an EXTREMELY HIGH influence on the general level of your success as a science teacher, and that this motivation is PARTLY due to your training for science teaching.

UNDER PRESENT CONDITIONS HOW WOULD YOU RATE: -

- 1a. Your own knowledge of the subject matter of science (as taught in the elementary school)? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your own knowledge of the subject matter of science (as taught in the elementary school) influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your knowledge of the subject matter of science (as taught in the elementary school) is due to your training for science teaching? (5) (4) (3) (2) (1)
- 2a. Your own understanding of the subject matter of science (as taught in the elementary school)? (5) (4) (3) (2) (1)

- 2b. To what extent does the degree of your own understanding of the subject matter of science (as taught in the elementary school) influence the general level of your success as a science teacher?

(5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your own understanding of the subject matter of science (as taught in the elementary school) is due to your training for science teaching?

(5) (4) (3) (2) (1)
- 3a. The positiveness of your attitude toward the teaching of science?

(5) (4) (3) (2) (1)
- b. To what extent does the degree of the positiveness of your attitude toward the teaching of science influence the general level of your success as a science teacher?

(5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of the positiveness of your own attitude toward the teaching of science is due to your training for science teaching?

(5) (4) (3) (2) (1)
- 4a. Your own motivation to teach science?

(5) (4) (3) (2) (1)
- b. To what extent does the degree of your own motivation to teach science influence the general level of your success as a science teacher?

(5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your own motivation to teach science is due to your training for science teaching?

(5) (4) (3) (2) (1)

- 5a. Your own ability to teach science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your own ability to teach science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your own ability to teach science is due to your training for science teaching? (5) (4) (3) (2) (1)
- 6a. Your own skills in teaching science? (5) (4) (3) (2) (1)
- b. To what extent does your own skills in teaching science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that your own skills in teaching science is due to your training for science teaching? (5) (4) (3) (2) (1)
- 7a. Your own confidence in teaching science? (5) (4) (3) (2) (1)
- b. To what extent does the degree of your own confidence in teaching science influence the general level of your success as a science teacher? (5) (4) (3) (2) (1)
- c. To what extent do you consider that the degree of your own confidence in teaching science is due to your training for science teaching? (5) (4) (3) (2) (1)

SECTION C

PLEASE TICK THE APPROPRIATE COLUMN FOR EACH OF THE FOLLOWING :

How much of the method you are now using to teach science do you think is due to: -

	A Great Deal	Much	A Moderate Amount	Not Very Much	Little or None
1. The way you were taught science at Teacher's College?					
2. The way you were told to teach science at Teacher's College?					
3. The way you were taught science at Primary School?					
4. The way you were taught science at Intermediate School?					
5. The way you were taught science at High School?					
6. Some other influence?					

Please comment on 6:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page.

APPENDIX I

SECTION A : TEACHER-RATINGS OF GENERAL TEACHING COMPETENCIES

		Questionnaire			Items		
		1a	1b	1c	2a	2b	2c
TEACHERS:							
G R O U P 1	1	4	4	3	5	5	4
	2	3	2	4	4	4	4
	3	3	3	4	4	4	3
	4	2	2	2	3	3	2
	5	2	3	2	3	3	3
	6	3	4	2	4	4	2
	7	3	2	3	3	3	4
Total, Group 1:		20	20	20	26	26	22
G R O U P 2	8	2	3	3	2	3	3
	9	2	2	2	3	2	2
	10	4	2	4	3	3	2
	11	4	4	4	3	4	4
	12	3	3	2	3	3	2
	13	1	1	2	3	4	2
	14	4	4	3	4	5	3
	15	2	2	2	NA	NA	NA
	16	4	4	4	5	3	5
	17	4	4	3	4	3	3
	19	4	2	2	5	5	1
	20	4	2	2	4	3	2
Total, Group 2:		42	36	36	42	41	31
Total, All Teachers:		62	56	56	68	67	53

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire					Items			
3a	3b	3c	4a	4b	4c	5a	5b	5c
4	4	4	3	3	5	3	3	3
5	4	3	4	4	3	4	5	4
2	2	1	2	2	2	4	4	1
2	4	2	3	3	3	3	4	3
2	3	2	3	4	4	1	5	2
5	4	3	4	4	3	5	4	3
4	3	4	4	3	4	3	4	3
24	24	19	23	23	24	23	29	19
2	3	2	2	3	2	3	3	3
4	3	3	3	3	3	4	4	2
3	4	2	4	3	2	4	4	3
4	4	3	4	5	3	4	4	4
1	3	2	3	3	3	3	4	2
5	4	2	4	4	2	3	2	2
5	4	2	4	3	2	4	2	1
3	3	2	3	3	2	3	4	2
1	1	1	1	1	1	3	2	1
4	5	4	4	4	2	3	4	3
5	1	1	5	5	3	1	1	5
4	3	2	4	3	4	4	3	2
2	4	2	2	4	3	3	4	3
43	42	28	43	44	32	42	41	33
67	66	47	66	67	56	65	70	52

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire						Items		
6a	6b	6c	7a	7b	7c	8a	8b	8c
4	4	4	3	2	1	2	2	2
4	3	4	3	2	4	2	2	1
3	3	2	1	1	1	NA	NA	NA
3	4	3	4	4	3	3	4	2
2	4	3	1	1	1	2	1	1
4	4	4	4	4	2	4	4	1
4	4	3	1	1	1	1	1	1
24	26	23	17	15	13	14	14	8
3	3	3	2	2	2	2	4	4
3	3	3	4	4	4	3	3	3
2	3	2	4	5	2	4	4	2
4	5	4	5	5	3	3	3	3
4	4	2	3	3	1	4	4	1
3	2	2	2	2	2	1	2	2
3	3	2	2	2	1	2	2	1
3	3	2	5	5	1	NA	NA	NA
5	3	1	1	1	1	NA	NA	NA
4	4	2	4	4	3	NA	NA	NA
5	5	3	NA	NA	NA	NA	NA	NA
3	3	2	NA	NA	NA	NA	NA	NA
3	4	4	3	4	2	1	2	2
45	45	32	35	37	22	20	24	18
69	71	55	52	52	35	34	38	18

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire Items								
9a	9b	9c	10a	10b	10c	11a	11b	11c
5	4	4	4	4	4	5	5	1
2	3	3	3	4	4	4	4	4
3	3	2	4	5	3	3	4	2
3	4	3	3	4	3	3	4	3
2	3	3	3	5	4	3	4	2
3	4	2	3	3	4	3	4	1
3	3	3	4	5	3	3	3	3
21	24	20	24	30	25	24	28	16
3	4	3	4	4	3	4	4	3
4	4	4	4	4	3	3	4	3
3	4	3	2	4	2	3	4	3
3	4	3	4	4	3	5	5	3
3	4	3	3	4	2	3	3	2
4	4	2	3	3	2	3	4	2
3	2	1	3	3	3	4	5	2
3	2	1	3	4	3	4	5	2
2	1	1	3	3	1	5	3	1
3	3	2	3	3	2	3	3	2
5	3	3	5	5	1	5	5	1
2	2	2	4	4	2	4	3	2
2	4	2	3	4	4	3	5	3
40	41	30	44	49	31	49	53	29
61	65	50	68	79	56	73	81	45

SECTION A CONTINUED

Questionnaire					Items			
12a	12b	12c	13a	13b	13c	14a	14b	14c
5	5	2	4	4	5	3	3	3
4	4	4	3.5	4	4	3	3	4
4	5	1	4	4	5	4	4	2
3	3	3	2	2	1	3	3	2
3	4	3	3	3	4	2	3	3
4	4	2	3	4	2	3	3	3
3	3	2	5	4	4	4	4	3
26	28	17	24	25	25	22	23	20
4	4	3	2	3	2	3	3	4
3	3	3	3	3	3	3	3	4
3	4	3	3	5	3	4	4	3
4	4	4	4	4	3	5	5	5
3	3	3	4	4	4	4	3	4
2	2	2	4	4	2	5	4	2
3	3	3	4	5	3	2	2	1
3	3	3	3	5	3	3	4	3
5	4	2	4	5	5	4	4	3
4	4	3.5	3	3	3	3	3	3
5	3	1	5	5	2	5	3	1
4	3	2	3	3	2	4	4	4
4	4	4	2	5	2	4	4	3
47	44	36.5	44	54	37	49	46	40
73	72	53.5	68.5	79	62	71	69	60

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire					Items			
15a	15b	5c	16a	16b	16c	17a	17b	17c
4	5	5	5	5	5	4	4	4
3	3	3	4	4	4	3	3	3.5
4	4	3	3	3	3	2	2	3
2	3	1	3	3	2	3	3	2
4	4	4	3	4	3	3	3	3
4	3	2	4	4	3	2	3	1
4	4	4	4	4	4	4	4	5
25	26	22	26	27	24	21	22	21.5
3	4	3	4	4	3	3	3	2
4	4	4	3	3	3	3	3	3
3	4	3	3	4	3	3	4	4
3	3	3	4	4	4	3	3	3
4	4	4	3	4	4	3	3	4
3	3	2	4	3	4	2	2	2
3	4	3	4	5	3	4	3	3
2	4	4	3	4	3	3	4	4
3	3	2	4	5	5	3	2	3
3	4	2	2	3	1	3	3	2
5	5	1	5	5	2	5	3	3
2	4	4	4	4	2	3	3	2
3	4	4	3	4	4	2	3	4
41	50	39	46	52	41	40	39	39
66	76	61	72	79	65	61	61	60.5

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire						Items		
18a	18b	18c	19a	19b	19c	20a	20b	20c
4	4	3	5	5	2	4	4	4
4	3	4	4	4	4	4	3	4.5
3	3	3	5	4	4	4	4	4
2	3	1	4	3	2	3	3	2
4	4	2	5	4	2	3	3	2
3	4	1	3	4	2	4	4	2
3	3	3	4	4	2	4	3	3
23	24	17	30	28	18	26	24	21.5
2	3	2	4	4	3	3	4	2
3	3	3	4	4	4	3	3	3
4	4	4	4	4	3	3	3	2
4	4	3	4	4	4	4	3	3
4	4	3	3	2	3	3	3	2
4	4	2	5	4	1	5	5	1
4	3	3	4	4	1	4	4	2
3	3	3	3	3	2	2	4	2
4	4	2	1	2	1	4	4	3
3	3	2	4	4	2	3	3	2
3	3	3	2	2	3	3	2	3
4	4	2	3	2	2	4	3	1
3	3	3	4	4	4	3	3	3
45	45	35	45	43	33	44	44	29
68	69	52	75	71	51	70	68	50.5

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire						Items		
21a	21b	21c	22a	22b	22c	23a	23b	23c
3	2	2	4	4	3	4	3	3
KNU	KNU	KNU	3	4	4	4	4	3
1	1	2	4	4	3	3	3	3
2	2	2	3	3	3	3	3	4
1	1	1	4	4	3	3	4	3
1	1	4	4	4	3	4	4	4
5	4	4	5	5	4	5	4	4
13	11	15	27	28	23	26	25	24
1	1	1	4	4	3	3	4	3
2	2	2	3	3	3	3	3	3
4	4	4	3	3	3	3	3	3
KNU	KNU	KNU	4	5	4	4	4	4
4	3	3	3	4	3	3	4	3
1	1	1	3	4	2	4	5	2
2	2	2	3	4	2	3	2	2
1	1	3	2	3	3	3	5	2
1	1	1	3	4	4	4	4	4
4	4	3	3	3	3	4	3	2
2	2	2	2	1	2	2	2	2
1	1	1	4	4	2	3	3	2
1	1	2	3	4	2	3	3	3
24	23	25	40	46	36	42	45	35
37	34	40	67	74	59	68	70	59

KNU = Kit Never Used

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire					Items			
24a	24b	24c	25a	25b	25c	26a	26b	26c
4	2	3	5	5	5	5	5	5
4	4.5	4	4	4	3	4	4.5	4
3	3	3	2	2	2	4	4	4
3	3	3	3	3	3	4	4	3
3	4	4	2	3	4	4	4	4
4	4	3	4	4	2	3	3	3
4	4	4	4	5	4	5	5	3
25	24.5	24	24	26	23	29	29.5	26
3	4	2	3	3	3	4	4	3
3	3	3	3	3	3	4	3	3
4	4	2	3	3	3	3	3	3
NA	NA	NA	4	4	5	4	5	4
3	3	3	3	4	4	3	4	4
3	2	2	4	3	2	5	5	2
3	3	3	3	3	3	4	4	3
2	4	2	2	4	3	4	4	4
4	4	5	3	2	5	4	5	4
3	3	3	4	3	2	4	4	3
2	3	1	2	3	1	2	2	1
3	4	4	2	3	3	4	4	4
3	3	3	3	3	3	4	4	3
36	40	33	39	41	40	49	51	41
61	64.5	57	63	67	63	78	79.5	67

NA = Not Applicable

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire						Items		
27a	27b	27c	28a	28b	28c	29a	29b	29c
5	5	5	5	5	5	5	5	5
4	4	4.5	3	3	3	4.5	4	4.5
2	2	1	4	4	3	4	4	4
4	4	3	4	4	3	4	4	3
2	2	2	4	4	4	2	2	3
3	3	3	4	4	3	3	3	3
4	4	3	5	5	4	5	5	4
24	24	21.5	29	29	25	27.5	27	26.5
3	4	3	3	4	3	4	4	3
3	3	3	3	3	3	3	3	3
3	3	2	4	4	3	3	3	3
3	3	3	4	4	4	3	3	3
3	4	4	3	4	4	3	4	4
2	2	2	2	2	2	2	2	2
2	2	2	4	3	2	2	3	2
2	3	3	2	3	4	3	4	3
2	2	3	4	4	4	1	4	3
3	3	2	3	3	3	3	3	2
3	2	2	1	2	3	1	2	2
4	4	4	3	3	4	3	4	4
2	3	3	4	3	3	4	4	4
35	38	36	40	42	42	35	43	38
59	62	57.5	69	71	67	62.5	70	64.5

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire					Items			
30a	30b	30c	31a	31b	31c	32a	32b	32c
5	5	5	5	5	5	5	5	5
4.5	4	4	4	4	4	4.5	4	4
4	3	2	2	2	2	3	2	2
3	3	2	3	3	2	3	3	2
3	3	3	2	2	3	3	3	3
2	3	4	2	2	4	4	3	2
4	4	4	5	4	4	5	4	4
25.5	25	24	23	22	24	27.5	24	22
4	4	3	3	3	3	3	4	3
3	3	3	3	3	3	4	4	4
3	3	3	3	3	3	3	3	3
4	3	3	NA	NA	NA	NA	NA	NA
3	4	4	3	4	4	3	4	4
3	2	2	2	2	2	4	3	2
4	4	3	2	2	2	2	2	2
3	4	4	3	4	4	4	4	4
3	3	3	1	3	1	4	4	4
3	4	3	3	2	2	4	4	3
2	2	2	1	2	2	2	3	2
2	4	4	2	4	4	4	3	2
4	3	3	3	3	3	4	4	4
41	43	40	29	35	33	41	42	37
66.5	68	64	52	57	57	68.5	66	59

NA = Not Applicable

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire					Items			
33a	33b	33c	34a	34b	34c	35a	35b	35c
3	3	3	4	4	5	4	4	4
4	4	4	4	4	3	3	3	4.5
4	4	3	4	4	3	3	4	1
4	3	2	4	4	2	3	4	2
2	3	3	3	4	4	2	3	2
4	3	3	3	3	2	2	2	5
4	4	4	5	5	3	4	4	4
25	24	22	27	28	22	21	24	22.5
3	4	2	4	4	2	2	4	2
3	3	3	3	3	3	2	2	2
3	3	3	3	3	3	2	2	2
4	3	4	4	4	4	3	4	3
3	3	3	3	4	3	2	3	2
3	3	2	4	4	3	2	2	2
3	4	2	3	5	3	2	2	2
4	5	3	4	4	4	2	3	3
4	4	2	3	3	2	3	4	5
3	3	3	3	3	3	3	3	2
2	1	2	2	3	3	2	1	1
2	4	4	4	3	2	2	2	2
3.5	4	2	3	5	2	3	3	3
40.5	44	35	43	48	37	30	35	31
65.5	68	57	70	76	59	51	59	53.5

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire						Items		
36a	36b	36c	37a	37b	37c	38a	38b	38c
4	4	5	3	3	3	5	5	5
4	3	4	4	4	4	5	4	3
4	4	4	3	3	3	2	2	2
3	3	2	4	4	3	4	4	3
2	2	3	2	2	2	3	3	2
2	2	4	3	2	4	3	3	2
5	5	5	4	4	3	5	4	4
24	23	27	23	22	22	27	25	21
3	4	3	3	4	2	4	4	3
2	2	2	2	2	2	2	2	2
3	3	3	2	2	4	2	2	4
3	3	3	4	4	4	3	4	4
3	4	4	2	4	2	2	4	2
2	2	2	3	3	2	3	3	2
2	4	3	3	4	2	3	4	3
2	3	3	3	4	4	2	3	3
4	3	5	4	4	5	4	4	4
3	3	2	2	3	2	3	3	2
5	4	4	4	3	3	1	2	1
2	3	4	4	2	4	4	3	3
3	4	3	2	4	2	3	3	2
37	42	41	38	43	38	35	41	35
61	65	68	61	65	60	62	66	56

APPENDIX I: CONTINUED

SECTION A CONTINUED

Questionnaire			Items		
39a	39b	39c	40a	40b	40c
4	4	4	3	3	1
3	3	3	4	4	4
2	2	1	3	2	1
4	4	3	2	2	2
3	3	2	NA	NA	NA
2	2	4	3	3	1
5	4	4	4	3	3
23	22	21	19	17	12
3	4	3	2	3	2
3	3	3	3	3	3
2	2	2	2	3	4
4	4	4	NA	NA	NA
1	3	2	1	3	3
3	4	2	3	3	2
3	4	2	2	2	1
4	3	3	2	3	3
4	3	2	4	1	1
3	4	4	3	2	2
2	2	3	2	2	1
3	3	2	NA	NA	NA
3	4	3	3	3	3
38	43	35	27	28	25
61	65	56	46	45	37

NA = Not Applicable

APPENDIX I : CONTINUEDSECTION B: TEACHER-RATINGS OF PERSONAL (TEACHER) ATTRIBUTES

		Questionnaire			Items		
		1a	1b	1c	2a	2b	2c
TEACHERS:							
G R O U P 1	1	4	4	4	4	4	4
	2	4	5	4	4	4	4.5
	3	3.5	3	4	3.5	3	3
	4	3	4	3	3	4	3
	5	3	4	4	3	4	4
	6	3	4	4	3	4	2
	7	3	3	3	3	2	3
Total, Gp.1:		23.5	27	26	23.5	25	23.5
G R O U P 2	8	2	4	4	2	4	4
	9	2	3	2	3	3	2
	10	3	3	2	4	4	2
	11	3	3	3	3	4	3
	12	5	4	1	5	4	1
	13	4	4	2	4	4	2
	14	2.5	3	2	3	3	3
	15	2	3	1	2	3	2
	16	5	4	1	5	3	1
	17	3	4	2	4	4	2
	18	4	5	1	4	4	1
	19	3	4	4	2	4	4
	20	3	5	2	3	4	2
Total, Gp. 2:		41.5	49	27	44	48	29
Total, All Teachers:		65	76	53	67.5	73	52.5

APPENDIX I: CONTINUED

SECTION B CONTINUED

Questionnaire				Items				
3a	3b	3c	4a	4b	4c	5a	5b	5c
5	5	4	4	4	4	4	4	5
4	4	3	3	3	3	4	4	4.5
4	4	4	3	3	3	4	4	4
2	4	4	2	4	4	3	4	3
3	4	2	4	4	4	3	4	3
3	4	1	4	4	2	3	4	2
5	5	3	5	4	3	4	4	4
26	30	21	25	26	23	25	28	25.5
3	4	4	2	4	4	3	4	4
3	3	2	2	3	3	3	3	2
3	4	2	4	4	2	3	3	4
4	4	4	4	4	4	3	4	4
4	4	3	4	4	2	3	5	4
3	3	2	4	4	2	3	4	2
2	4	3	3	4	3	3	4	2
3	3	3	2	4	2	2	4	2
3	5	3	3	5	4	4	5	4
3	3	2	3	3	2	3	4	2
5	3	3	4	4	1	4	4	1
4	3	1	3	4	2	2	4	4
2	5	2	3	4	4	3	3	3
42	48	34	41	51	35	39	51	38
68	78	55	66	77	58	64	79	63.5

APPENDIX I: CONTINUED

SECTION B CONTINUED

Questionnaire			Items		
6a	6b	6c	7a	7b	7c
4	4	5	5	5	5
4	4	4.5	4	4	4
4	5	3	4	4	4
3	4	3	2	4	4
3	4	4	3	3	4
3	4	3	3	3	2
5	5	4	5	4	4
26	30	26.5	26	27	27
3	4	4	3	4	4
2	3	2	3	3	2
3	3	3	3	4	2
3	4	4	4	4	4
3	4	4	4	4	3
3	4	2	2.5	3	3
3	3	2	2.5	4	3
2	4	3	2	3	2
4	5	3	5	4	1
3	3	2	3	3	2
4	2	2	4	4	2
3	3	2	2	4	4
3	3	3	3	3	3
39	45	36	41	43	35
65	75	62.5	67	70	62

APPENDIX I: CONTINUED

SECTION C: TEACHER-ATTRIBUTION OF TEACHING PATTERNS TO PREVIOUS EXPERIENCE

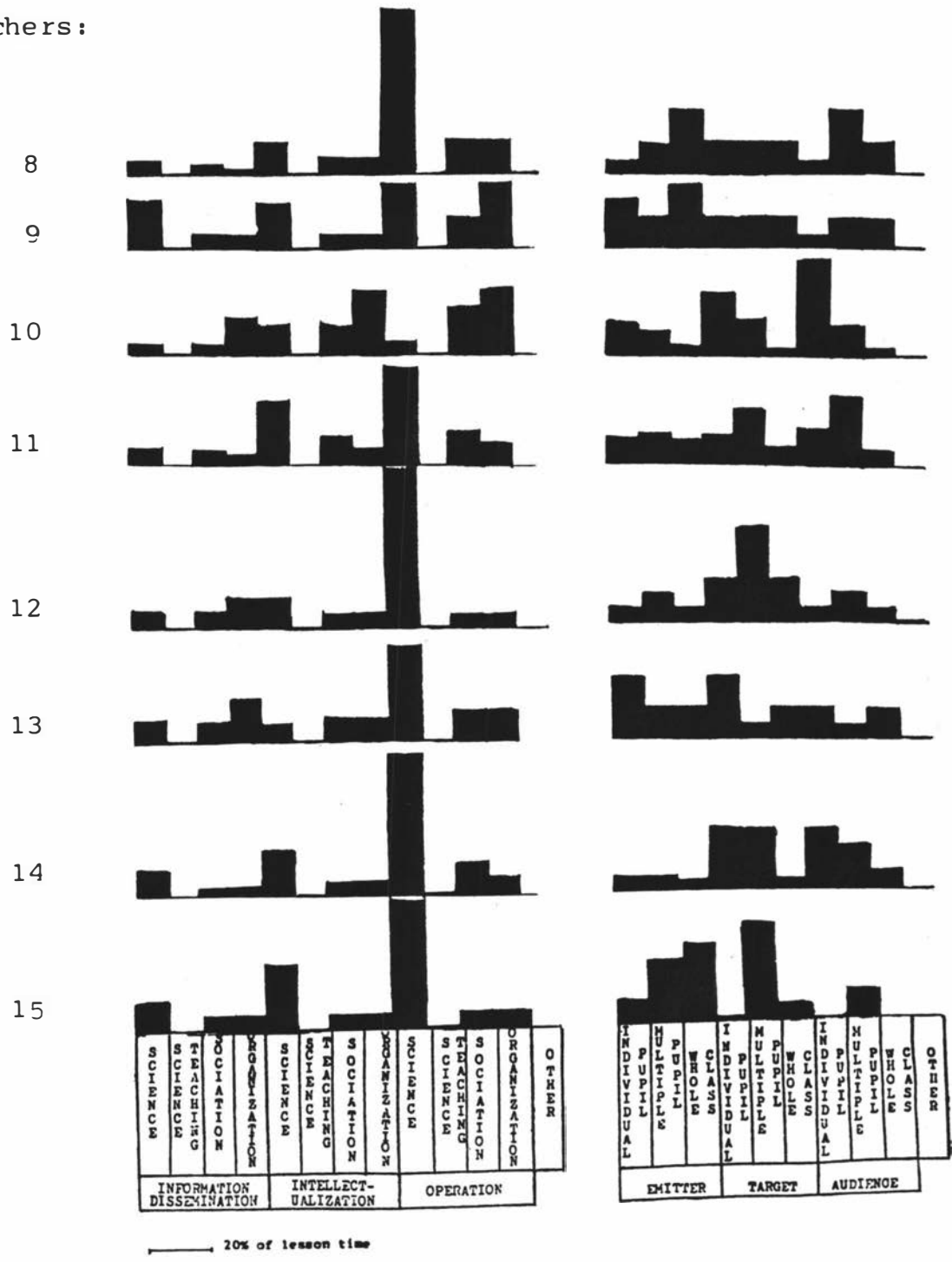
		Attribution of teaching behaviours to:					
		The way science was taught at Teachers College	The way science was recommended to be taught at Teachers College	The way science was taught at Py. School	The way science was taught at Intermediate School	The way science was taught at High School	Some other influence
Teachers							
G R O U P 1	1	3	1	2	3	4	-
	2	5	2	1	1	1	-
	3	2	2	2	2	2	4
	4	3	4	1	1	4	-
	5	3	3	1	2	2	-
	6	1	3	4	2	1	-
	7	4	5	1	1	1	-
G R O U P 2	8	2	1	2	2	2	-
	9	2	2	3	3	3	3
	10	3	3	1	1	3	5
	11	3	4	4	NA	2	-
	12	5	5	1	NA	2	3
	13	2	1	5	5	3	-
	14	2	2	1	1	1	4
	15	2	3	1	1	1	-
	16	2	4	1	1	1	4
	17	2	3	3	3	2	5
	18	2	2	1	1	1	1
	19	1	1	1	1	1	-
	20	1	2	3	4	4	-

Rating Scale: 5 - A great deal
4 - Much
3 - A moderate amount
2 - Not very much
1 - Little or more

N.A. = Not applicable

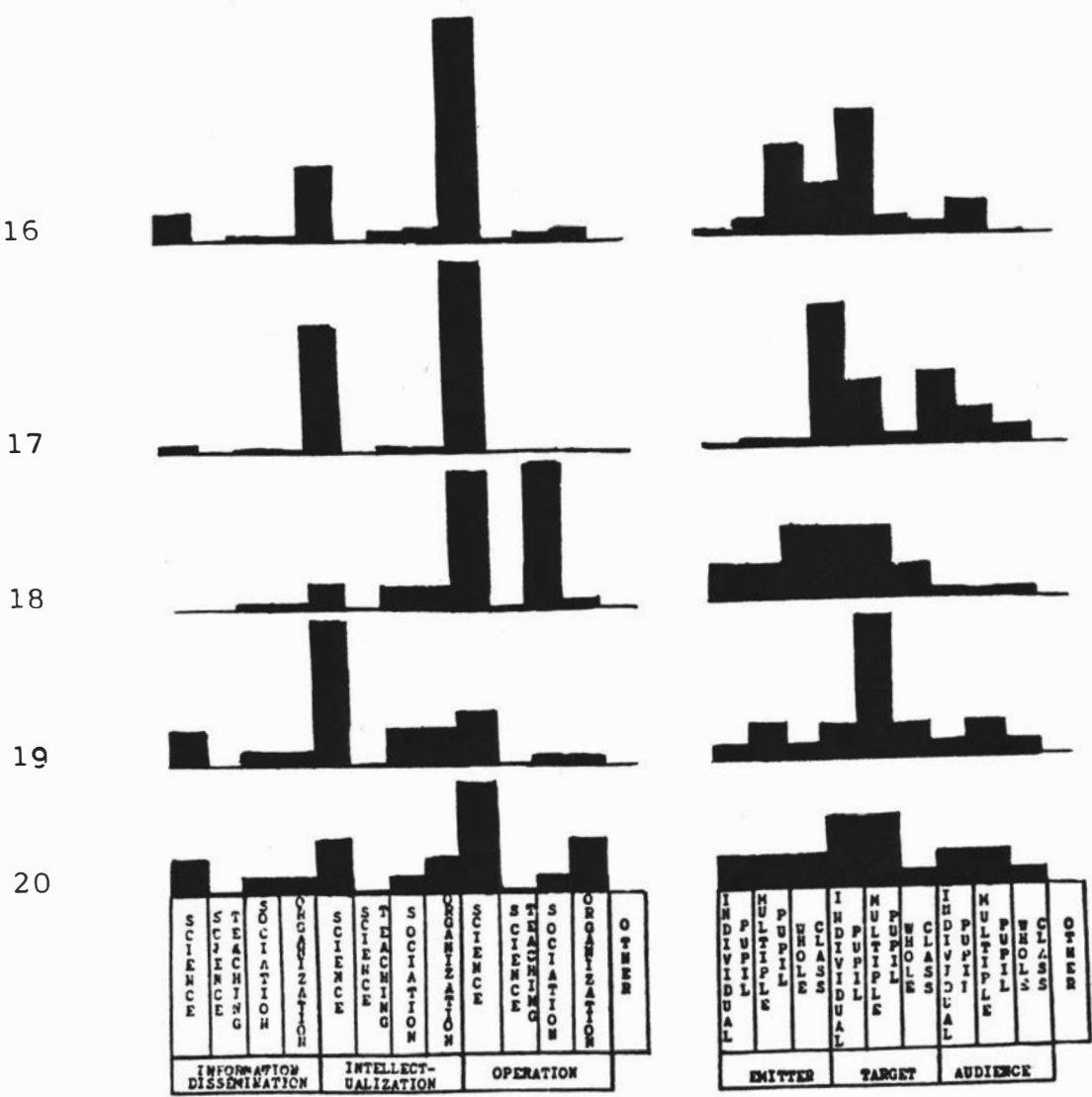
APPENDIX J: CONTINUED

Teachers:



APPENDIX J: CONTINUED

Teachers :



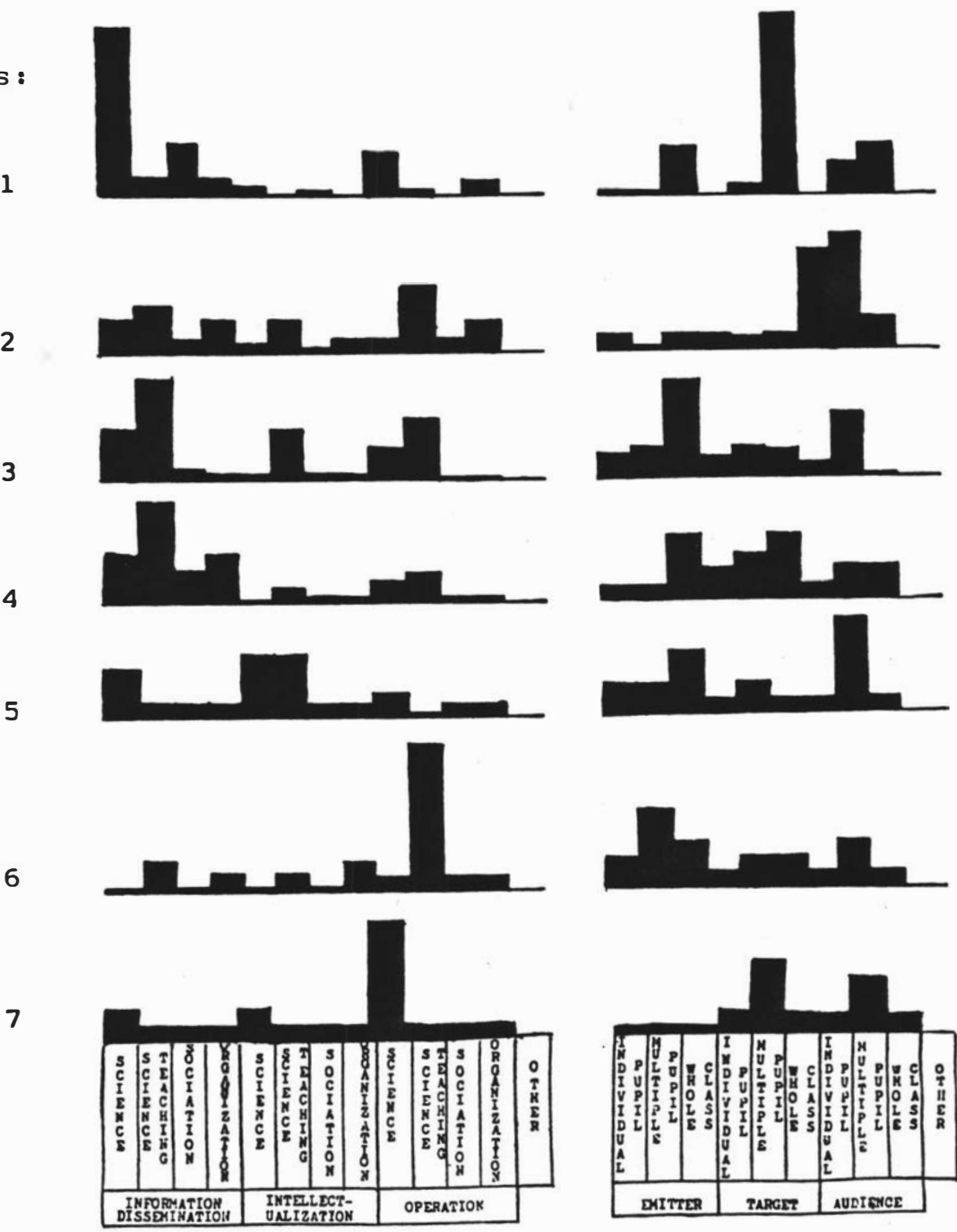
APPENDIX K

INDIVIDUAL TEACHER-PERCEPTIONS OF LECTURER-TRANSACTIONS

a. Functional Transactions

b. Structural Transactions

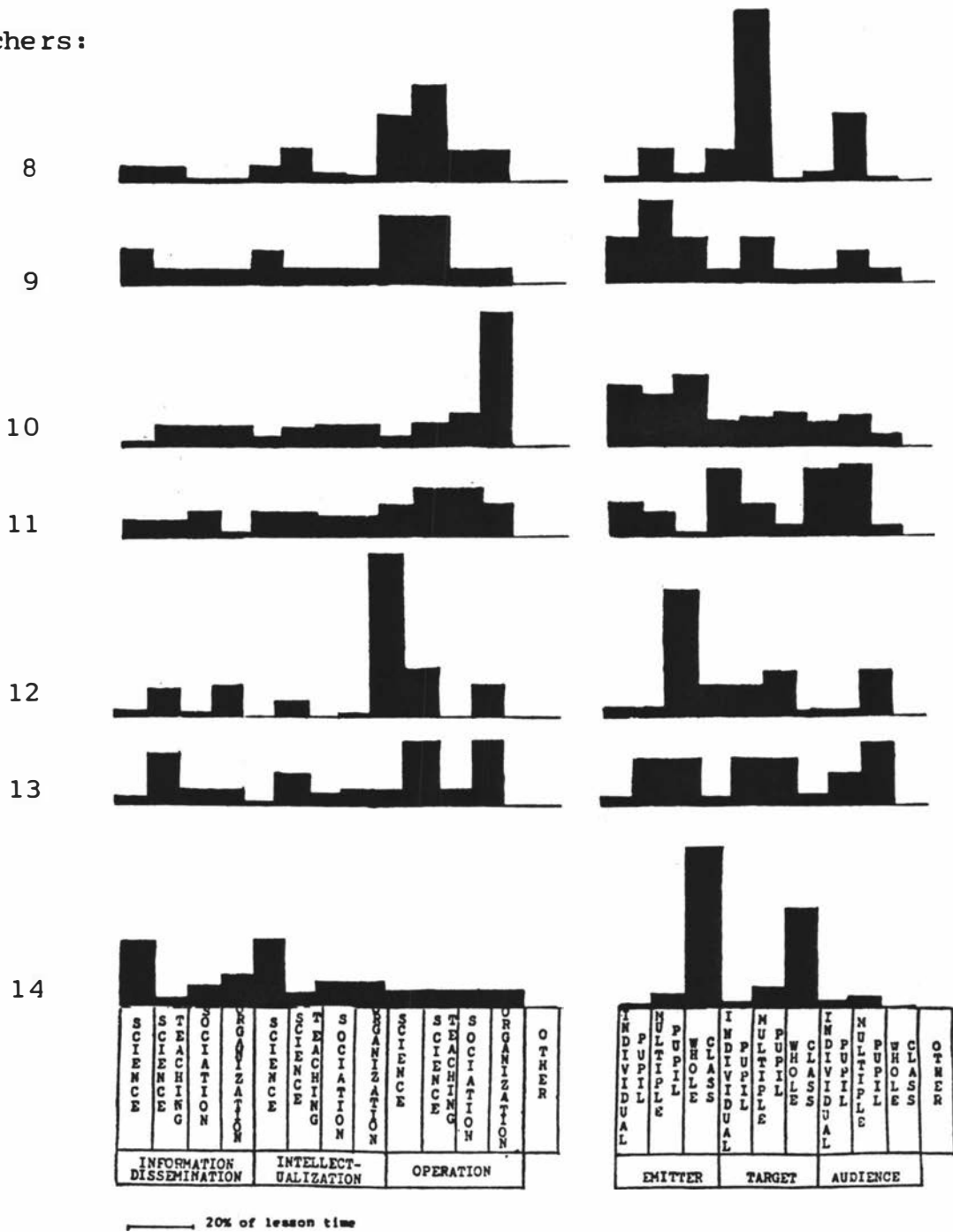
Teachers :



20% of lesson time

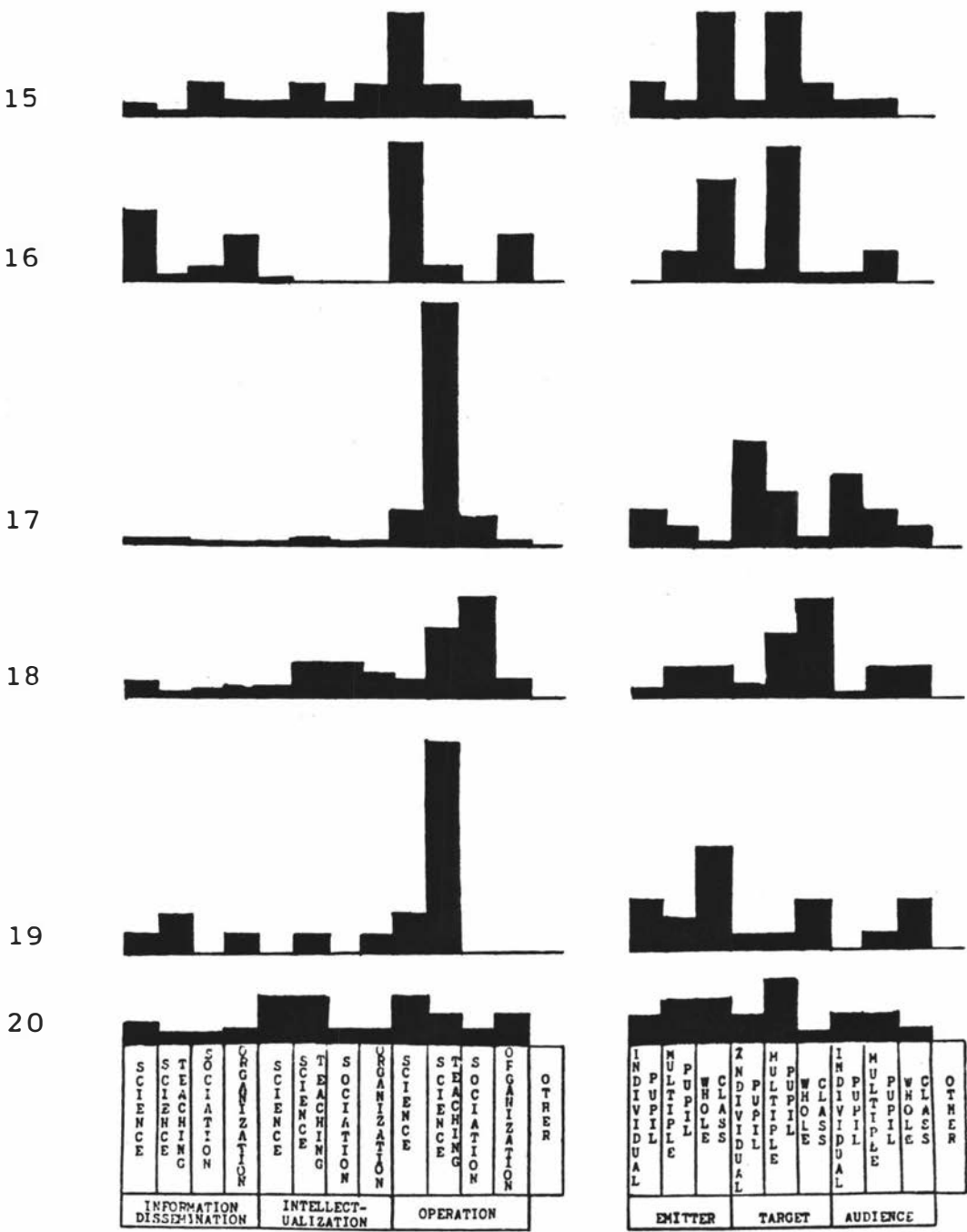
APPENDIX K: CONTINUED

Teachers:



APPENDIX K: CONTINUED

Teachers:

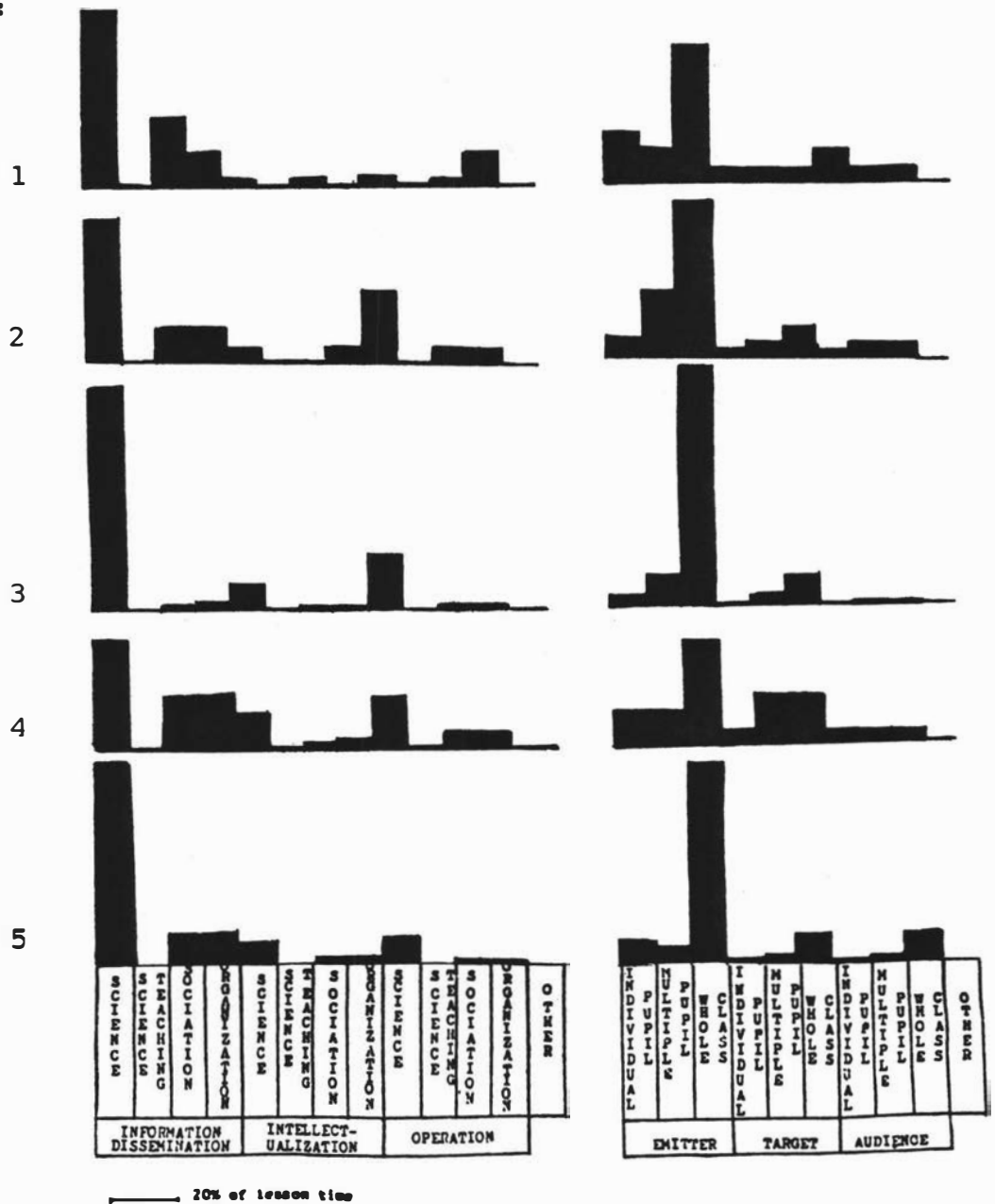


APPENDIX L

INDIVIDUAL TEACHER-PERCEPTIONS
OF "PRE-COLLEGE" TEACHERS' TRANSACTIONS

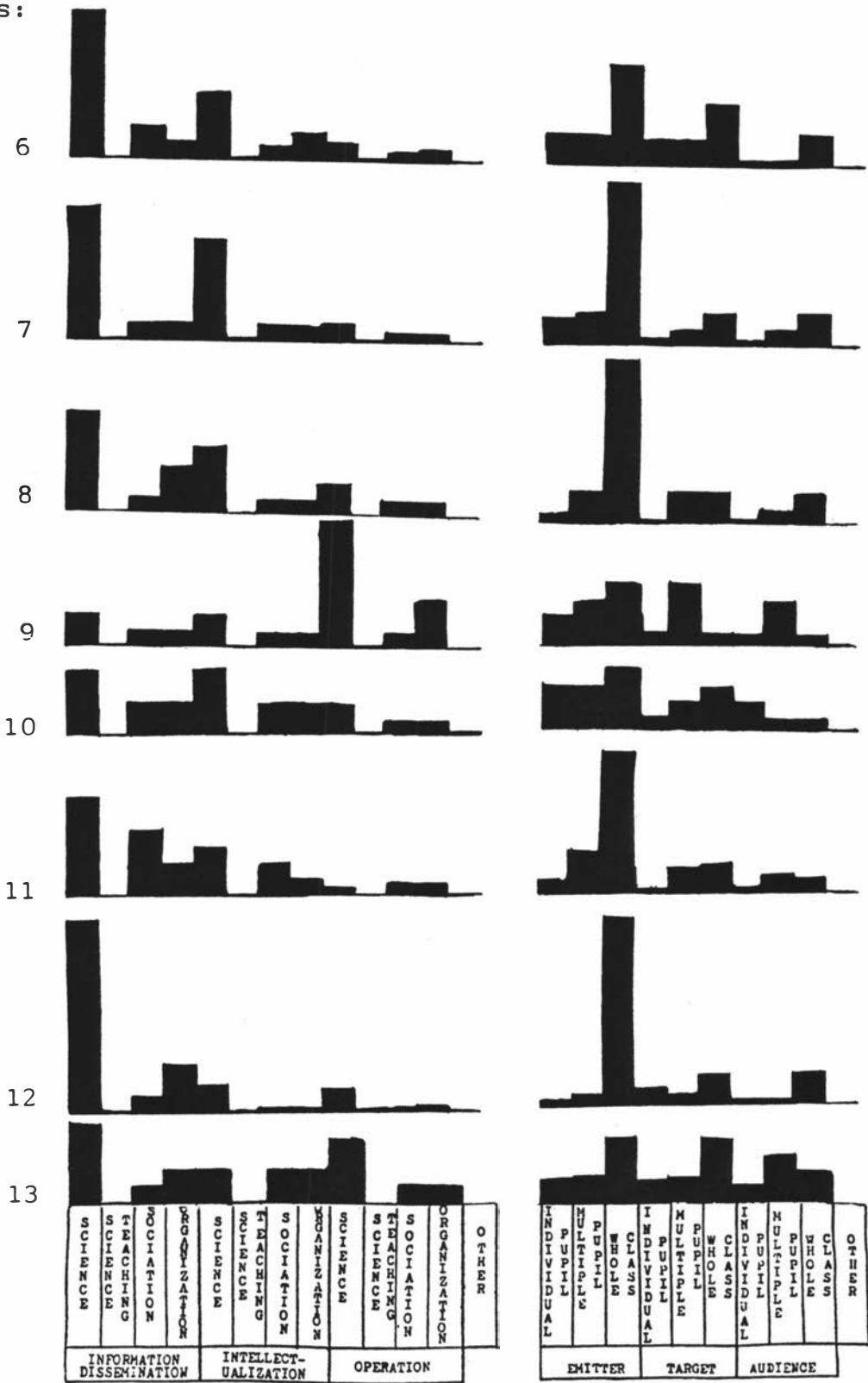
a. Functional Transactions b. Structural Transactions

Teachers:



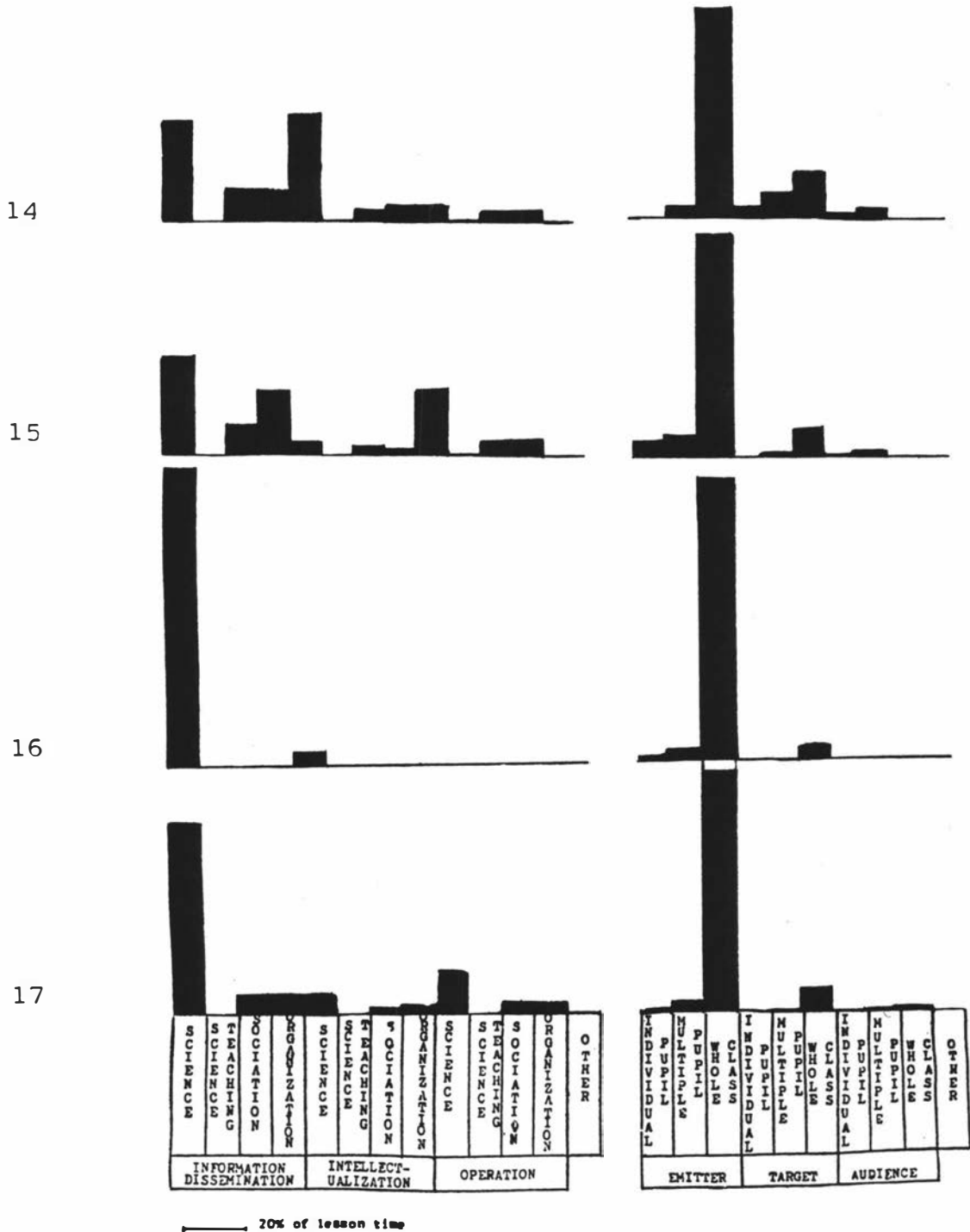
APPENDIX L: CONTINUED

Teachers:



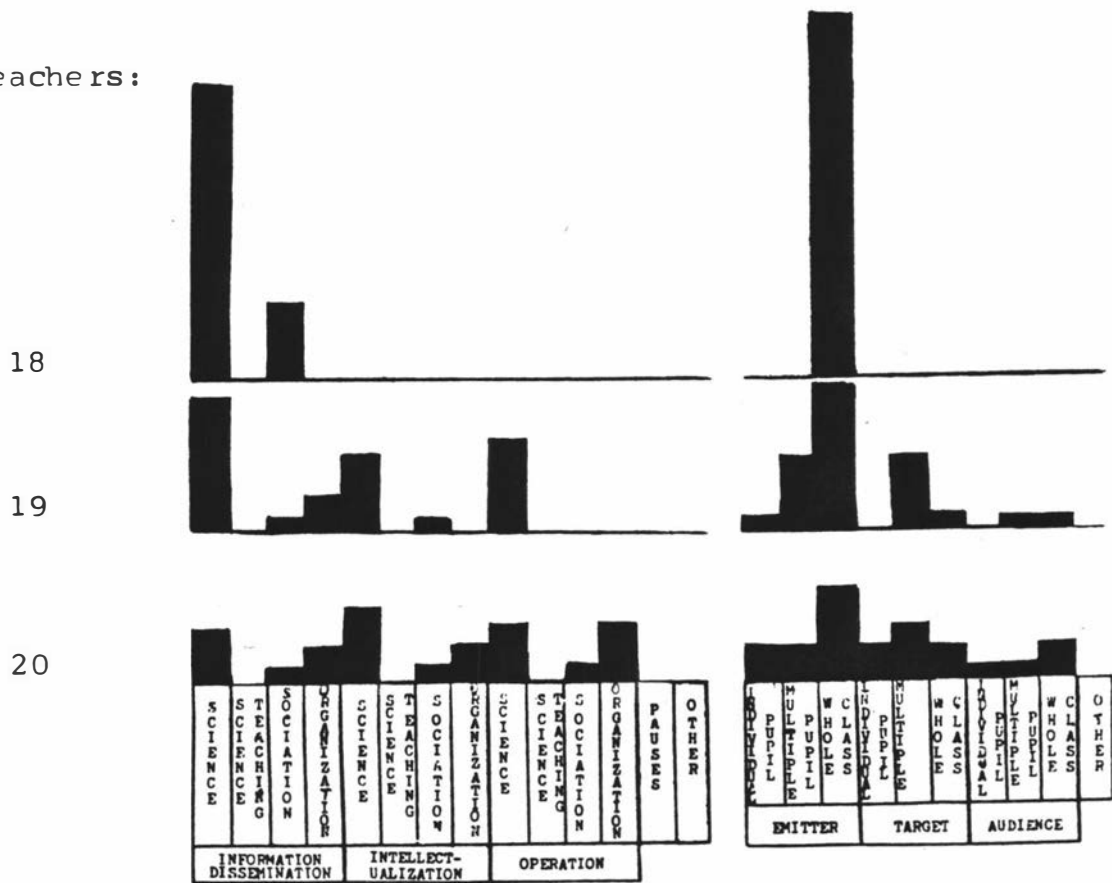
APPENDIX L: CONTINUED

Teachers :



APPENDIX L: CONTINUED

Teachers:



———— 20% OF LESSON TIME

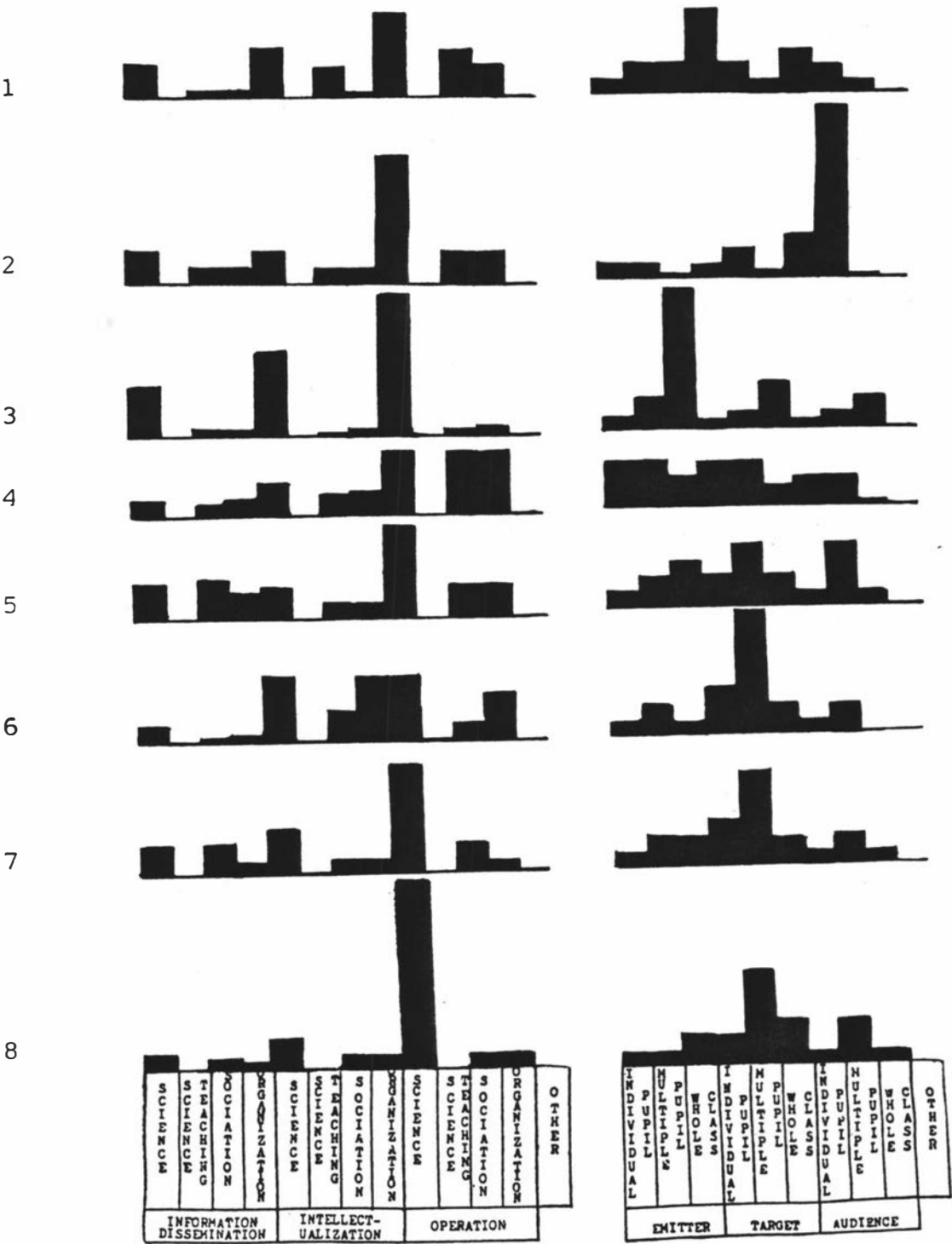
APPENDIX M

INDIVIDUAL TEACHERS: RECOMMENDED TRANSACTIONAL PATTERNS

a. Functional Transactions

b. Structural Transactions

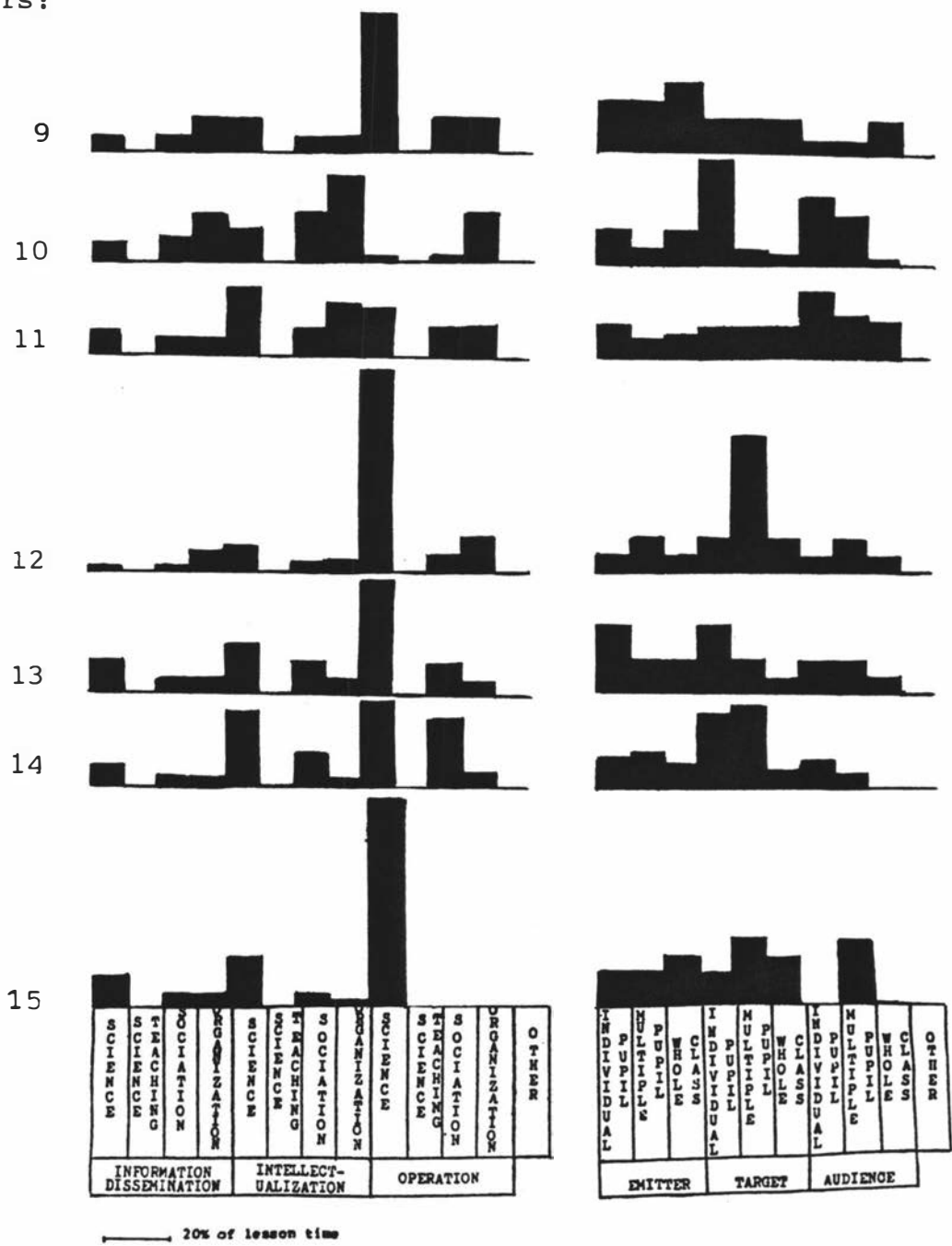
Teachers:



20% of lesson time

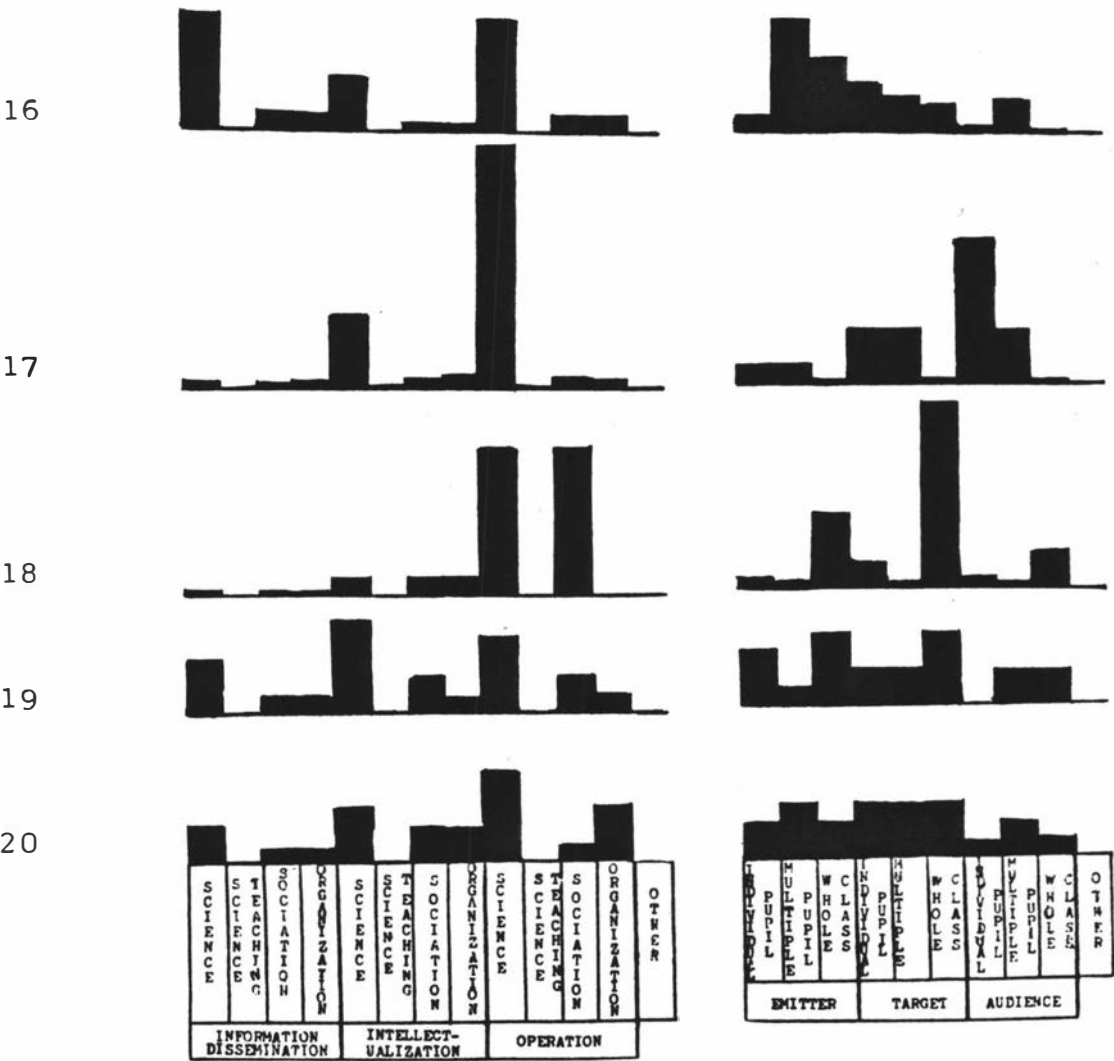
APPENDIX M: CONTINUED

Teachers:



APPENDIX M: CONTINUED

Teachers:



20% OF LESSON TIME

APPENDIX N

INDIVIDUAL TEACHERS:

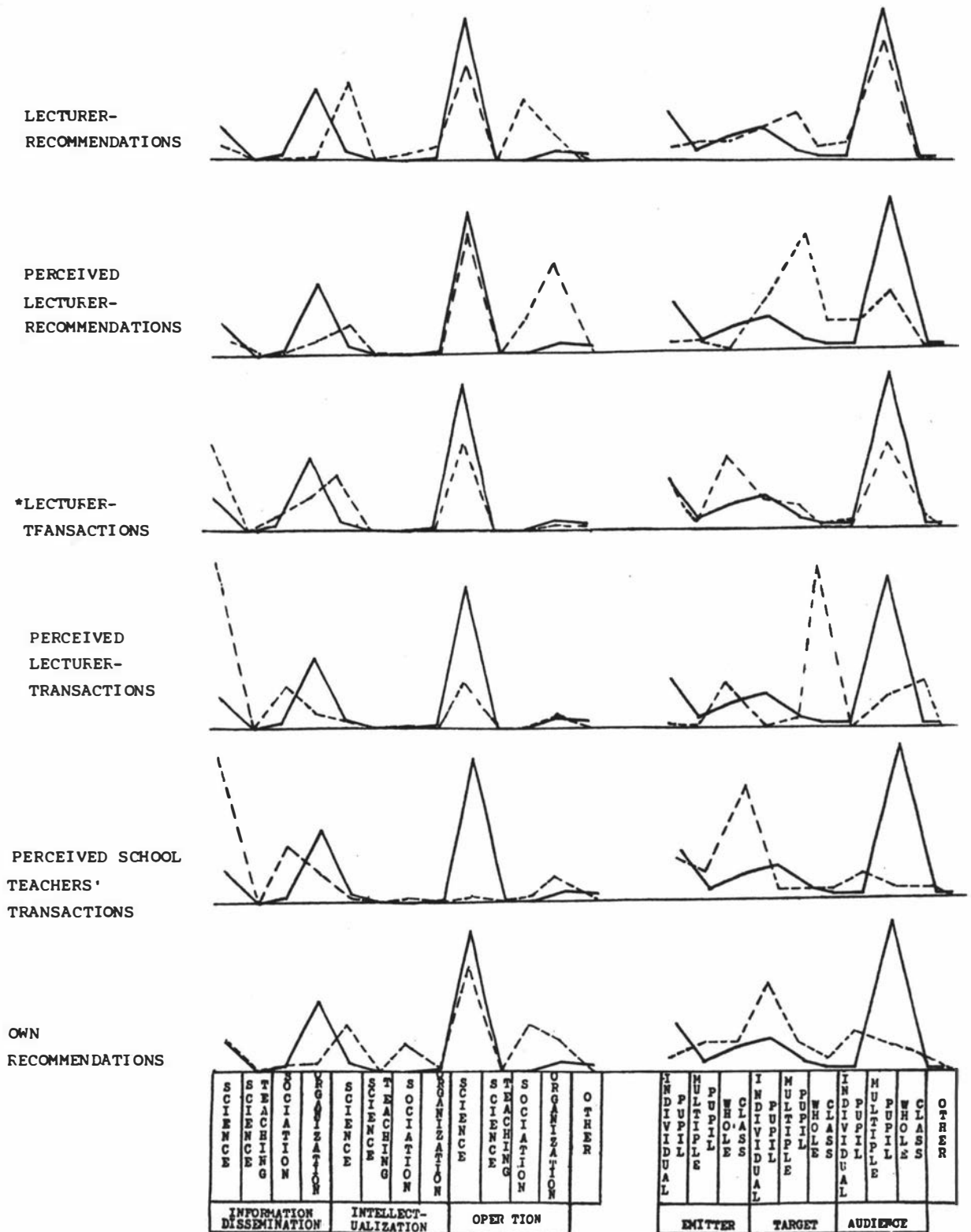
ACTUAL TRANSACTIONAL PATTERNS VIS-À-VIS ALTERNATIVES

APPENDIX N

ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 1

a. Functional Transactions

b. Structural Transactions



_____ 20% OF LESSON TIME
 _____ TEACHER-TRANSACTIONS
 - - - - - OTHER TRANSACTIONS

- FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

a. Functional Transactions

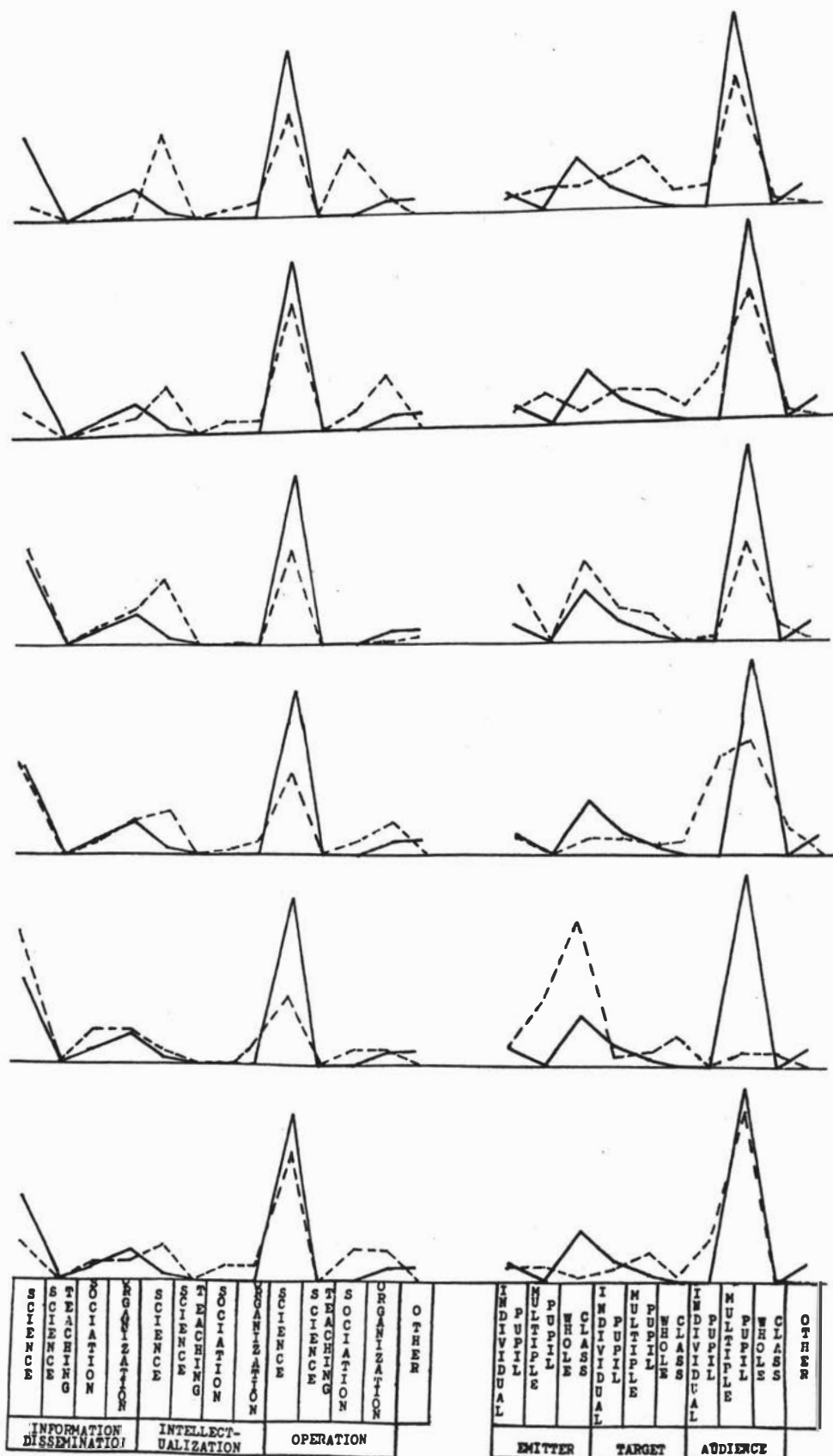
b. Structural Transactions

PERCEIVED
LECTURER-
RECOMMENDATIONS

★ LECTURER-
TRANSACTIONS

PERCEIVED
LECTURER-
TRANSACTIONS

PERCEIVED
SCHOOL TEACHERS'
TRANSACTIONS

OWN
RECOMMENDATIONS

_____ 20% OF LESSON TIME
 _____ TEACHER-TRANSACTIONS
 - - - - - OTHER TRANSACTIONS

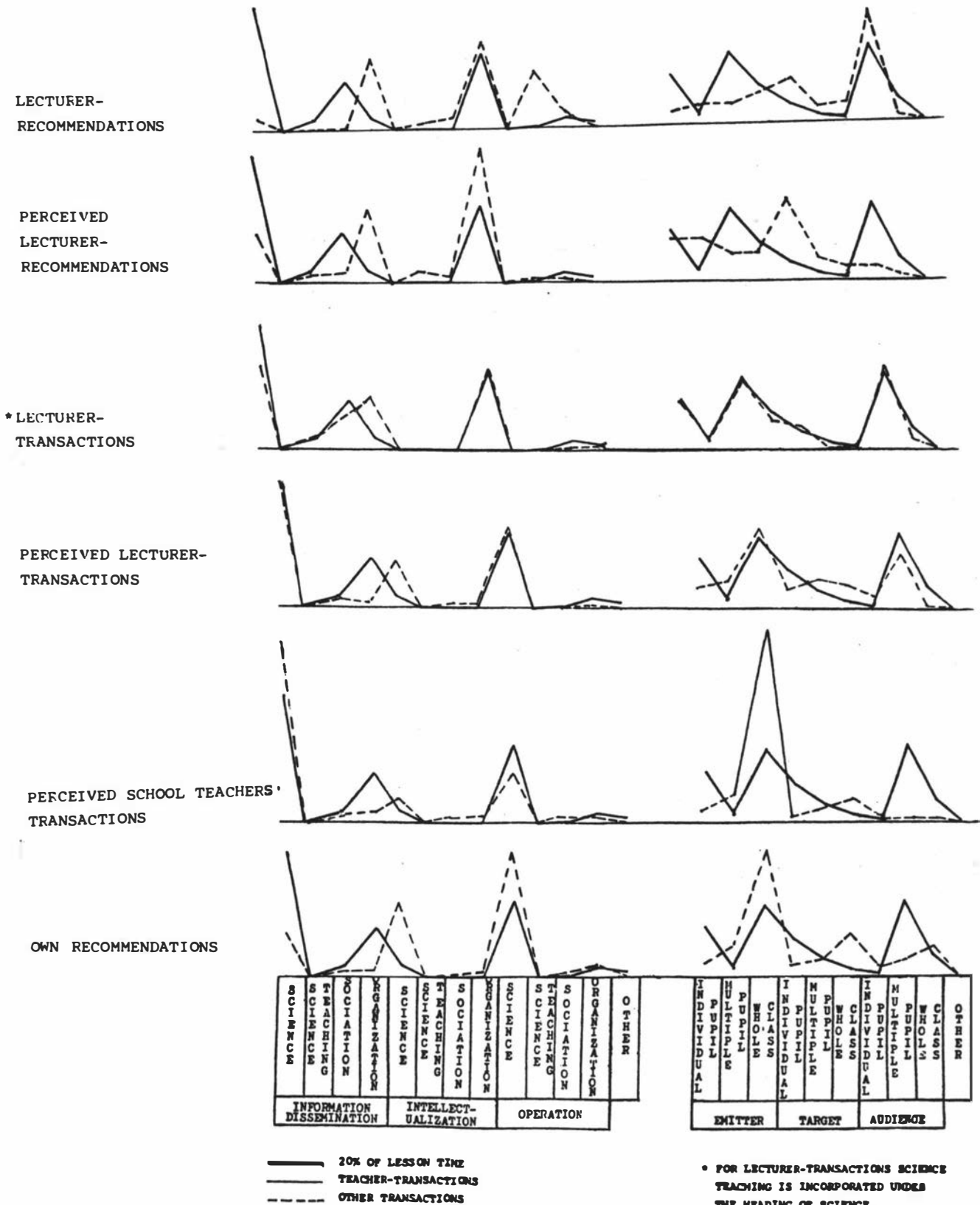
• FOR LECTURER-TRANSACTIONS SCIENCE
TEACHING IS INCORPORATED UNDER
THE HEADING OF SCIENCE

APPENDIX N

ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 3

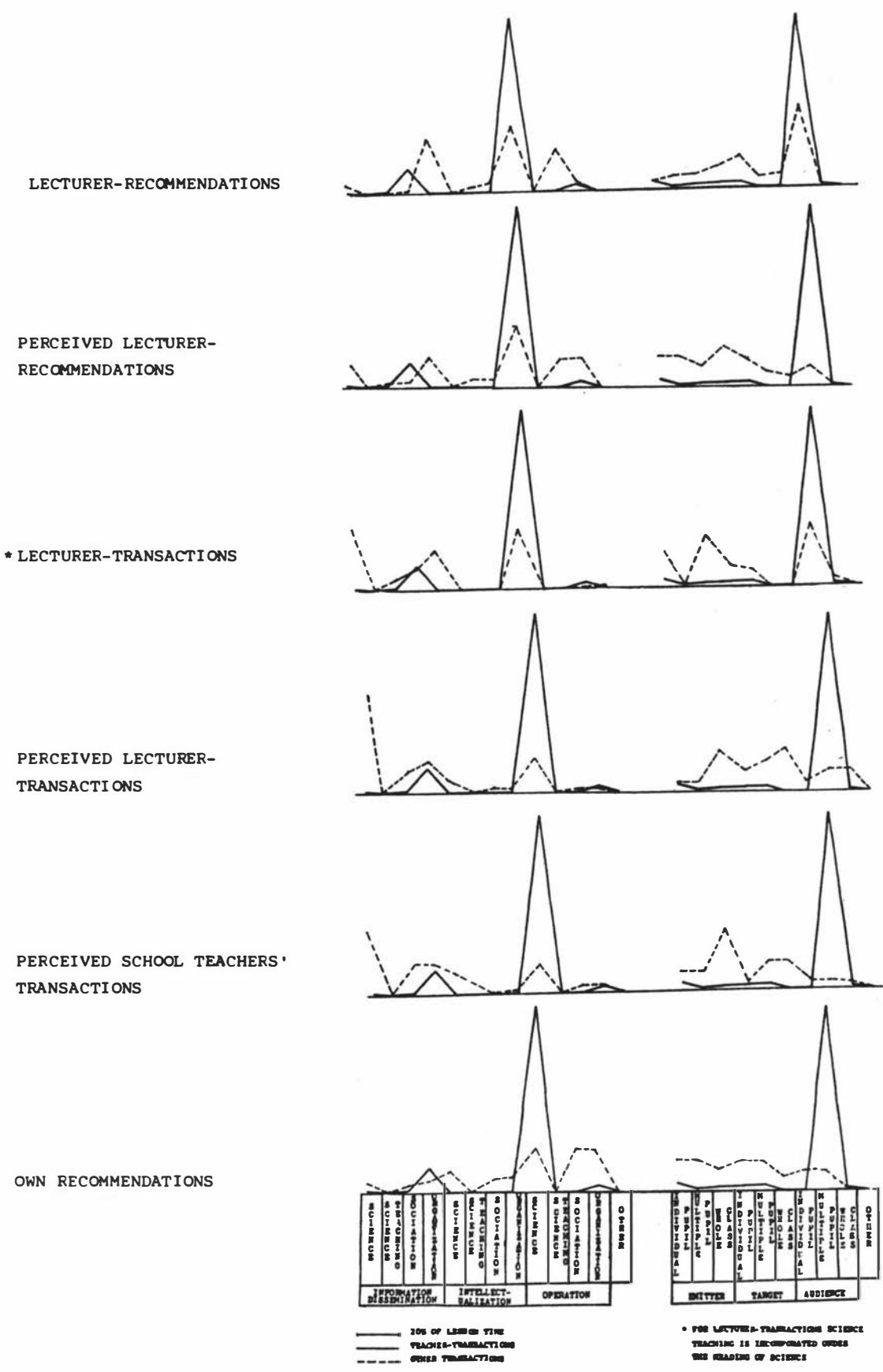
a.Functional Transactions

b. Structural Transactions



ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 4

a. Functional Transactions b. Structural Transactions



ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 5

a. Functional Transactions

b. Structural Transactions

LECTURER-RECOMMENDATIONS

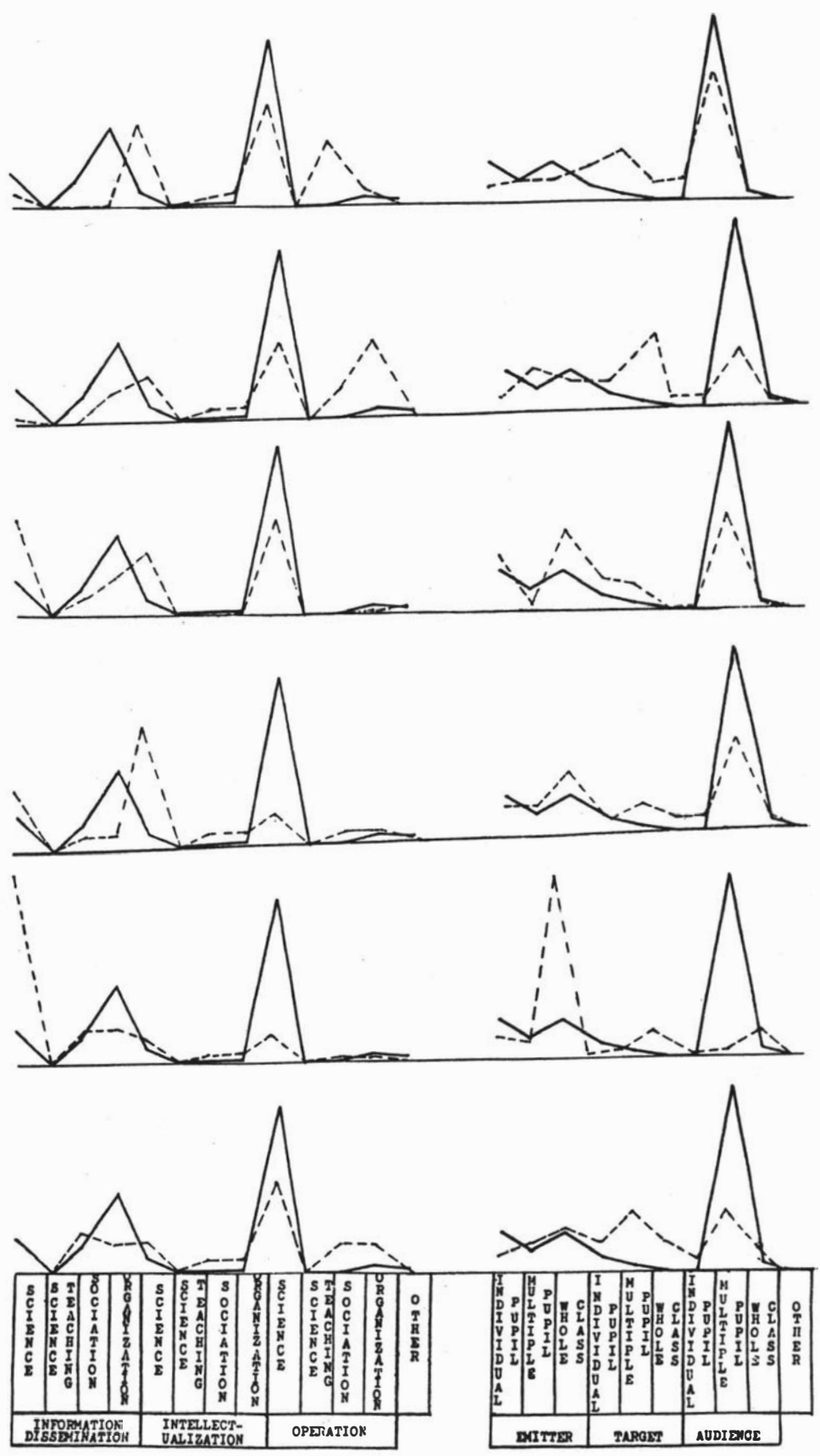
PERCEIVED LECTURER-RECOMMENDATIONS

*LECTURER-TRANSACTIONS

PERCEIVED LECTURER-TRANSACTIONS

PERCEIVED SCHOOL TEACHERS' TRANSACTIONS

OWN RECOMMENDATIONS



— 20% OF LESSON TIME
- - - TEACHER-TRANSACTIONS
... OTHER TRANSACTIONS

* FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

APPENDIX N

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 6

a. Functional Transactions

b. Structural Transactions

LECTURER-RECOMMENDATIONS

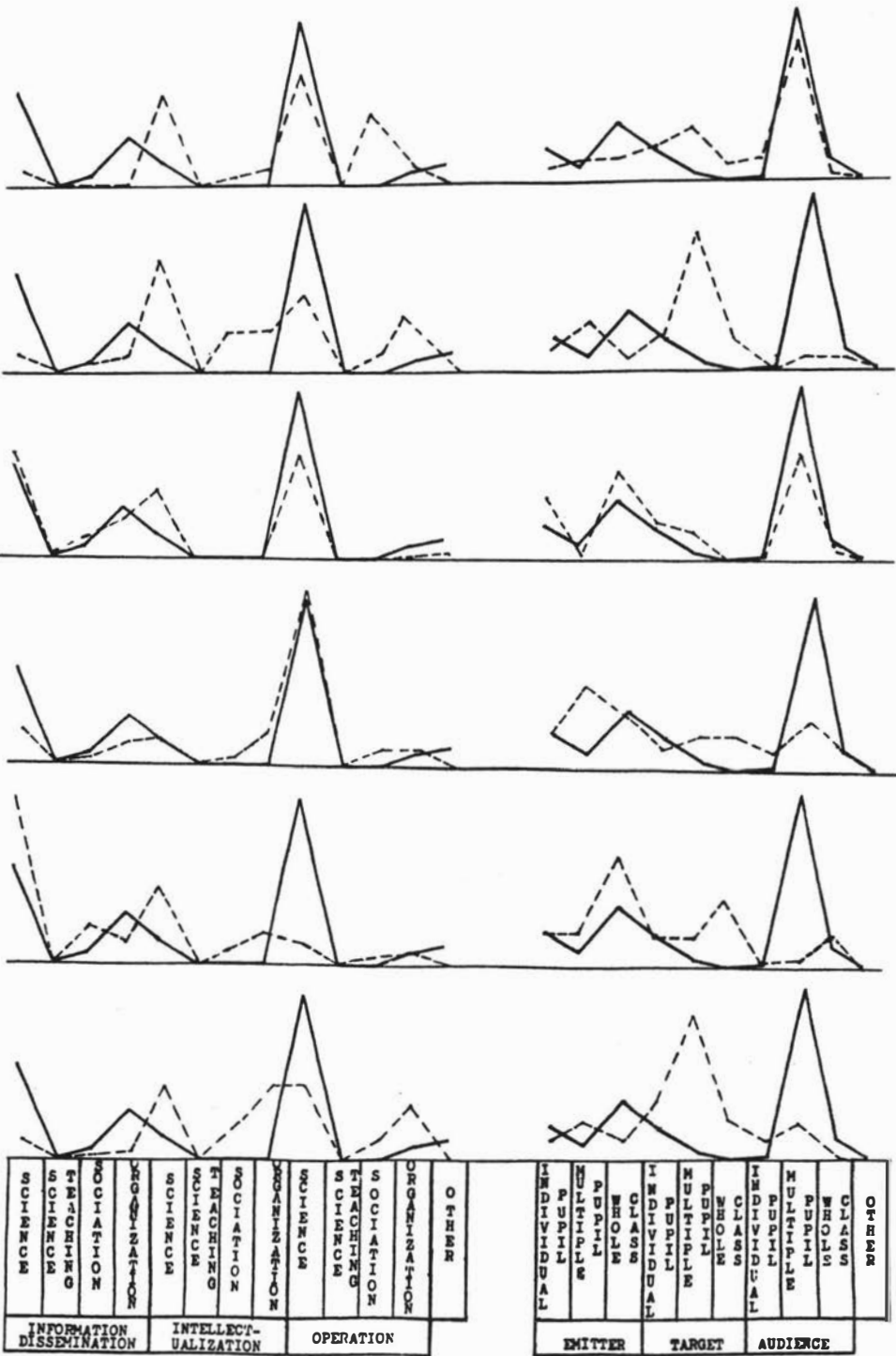
PERCEIVED LECTURER-RECOMMENDATIONS

*LECTURER-TRANSACTIONS

PERCEIVED LECTURER-TRANSACTIONS

PERCEIVED SCHOOL TEACHERS' TRANSACTIONS

OWN RECOMMENDATIONS



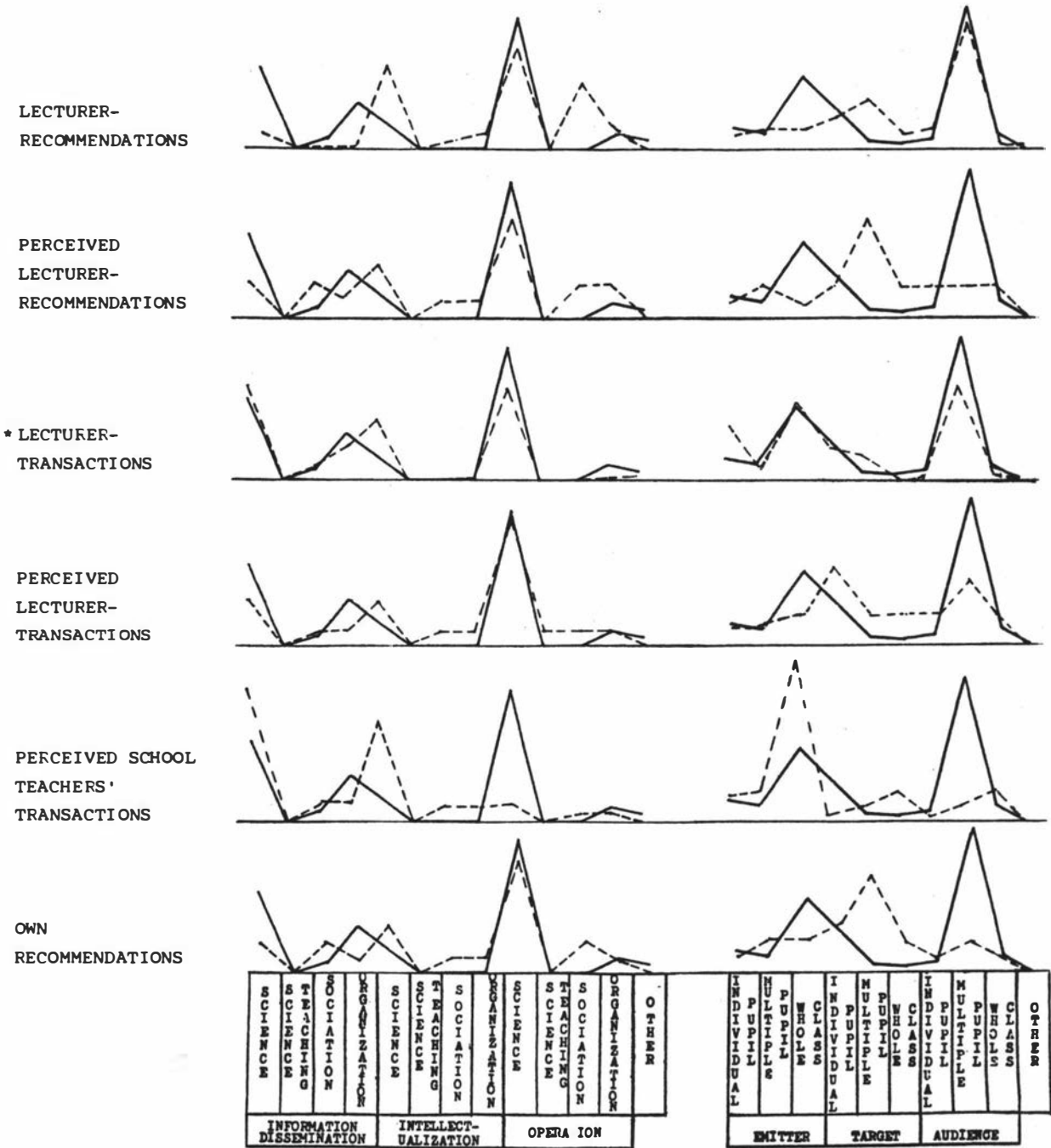
— 20% OF LESSON TIME
- - - TEACHER-TRANSACTIONS
... OTHER TRANSACTIONS

* FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 7

a. Functional Transactions

b. Structural Transactions



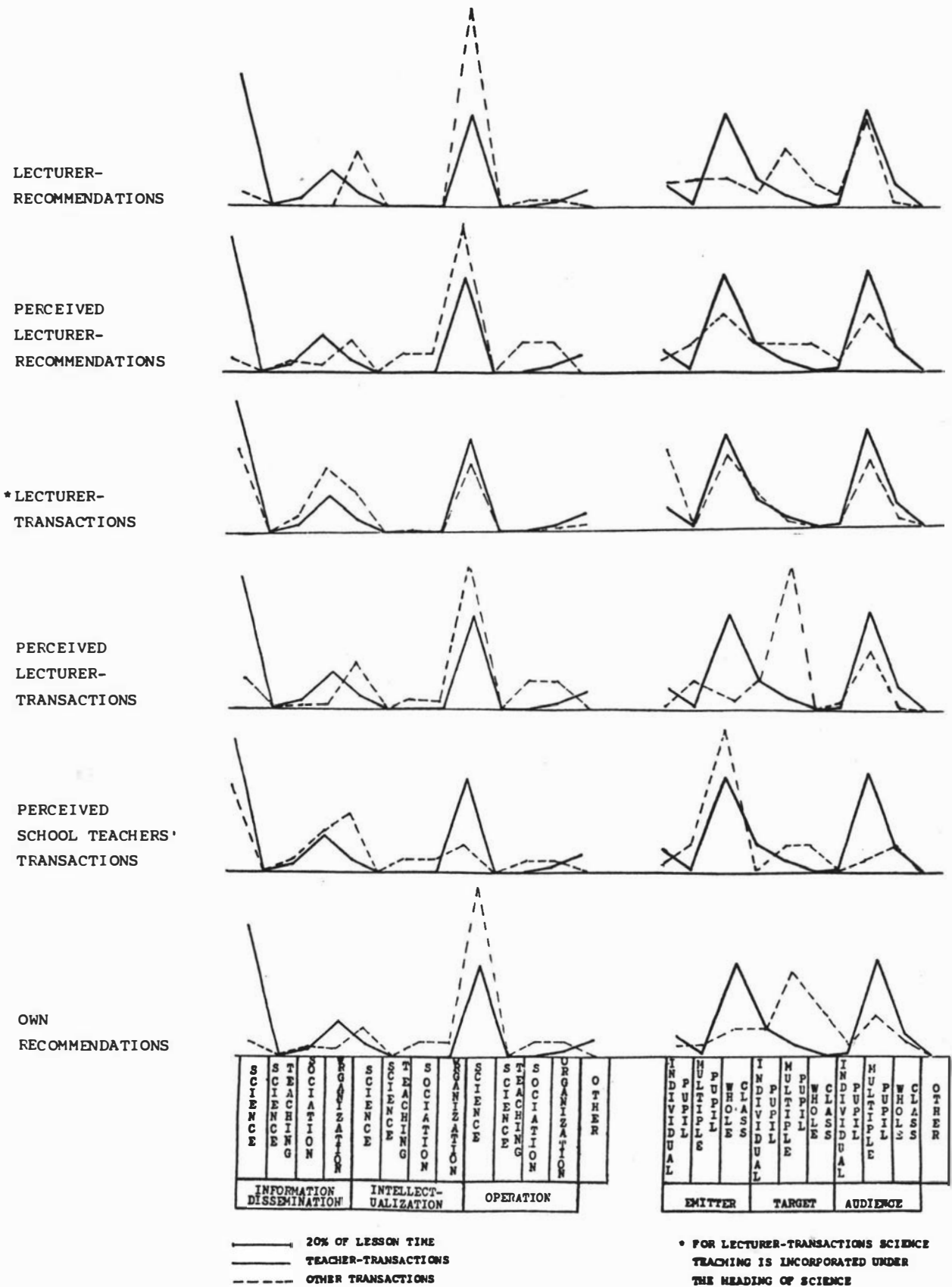
———— 20% OF LESSON TIME
----- TEACHER-TRANSACTIONS
----- OTHER TRANSACTIONS

* FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 8

a. Functional Transactions

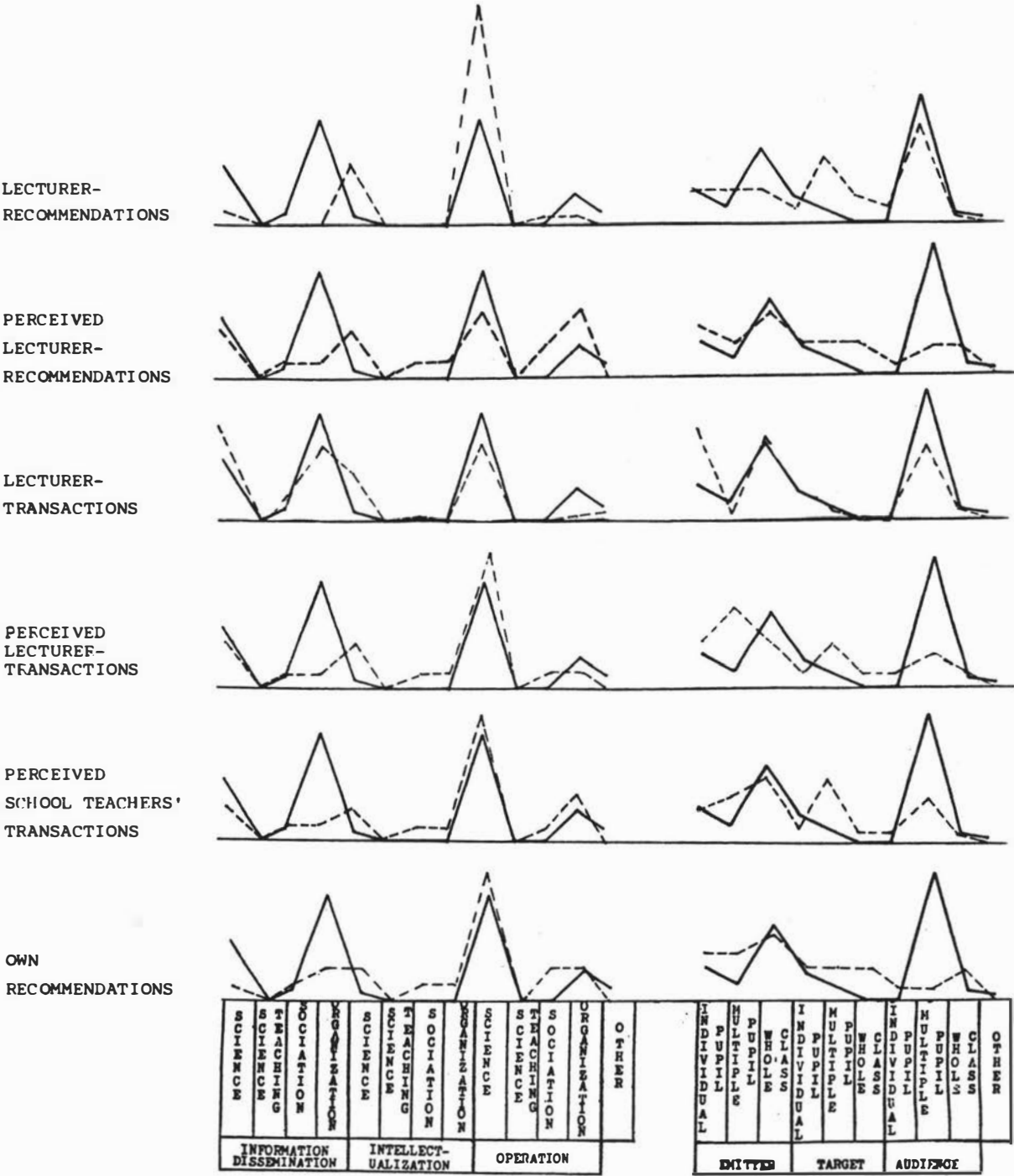
b. Structural Transactions



APPENDIX N

ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 9

a. Functional Transactions b. Structural Transactions

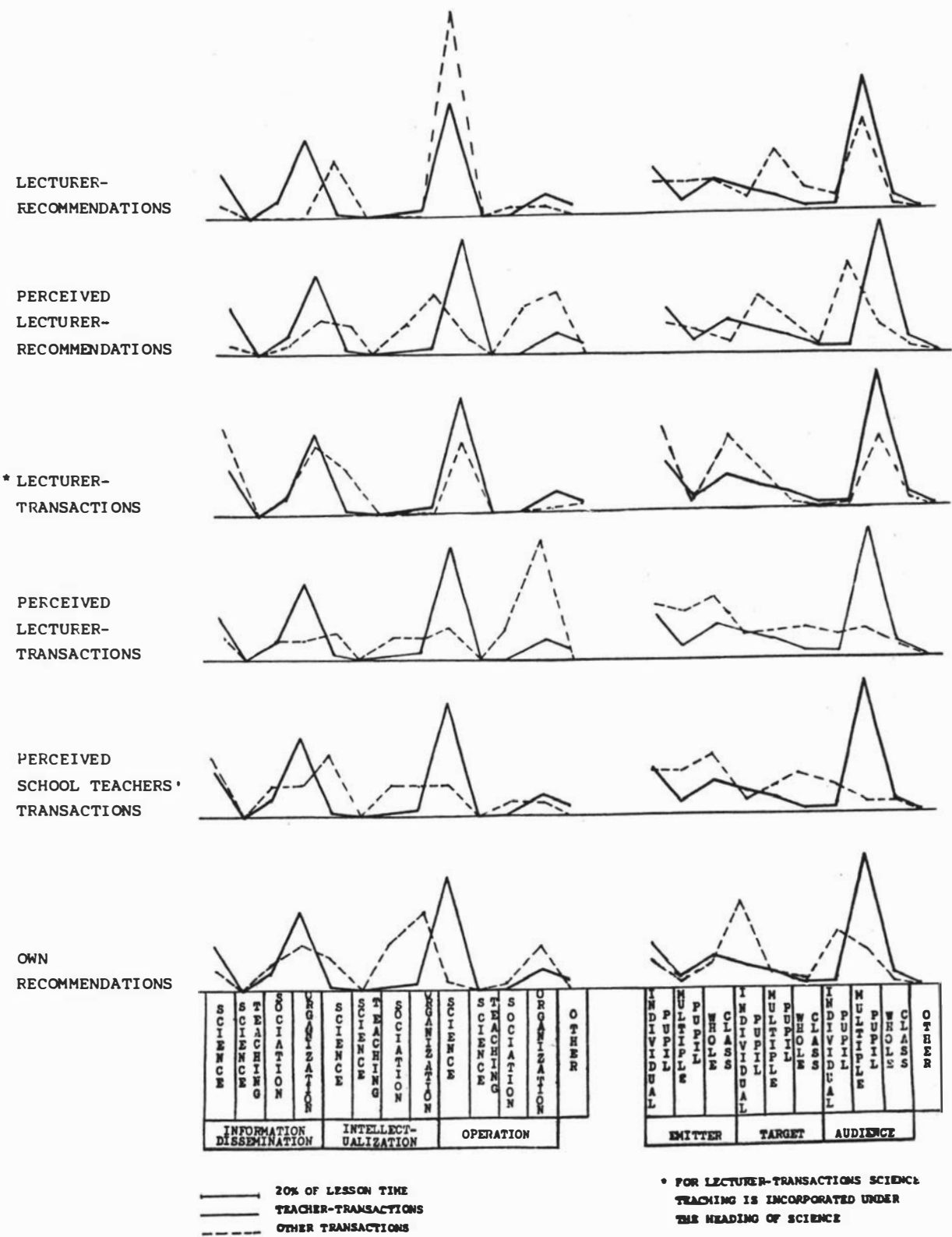


———— 20% OF LESSON TIME
----- TEACHER-TRANSACTIONS
..... OTHER TRANSACTIONS

• FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

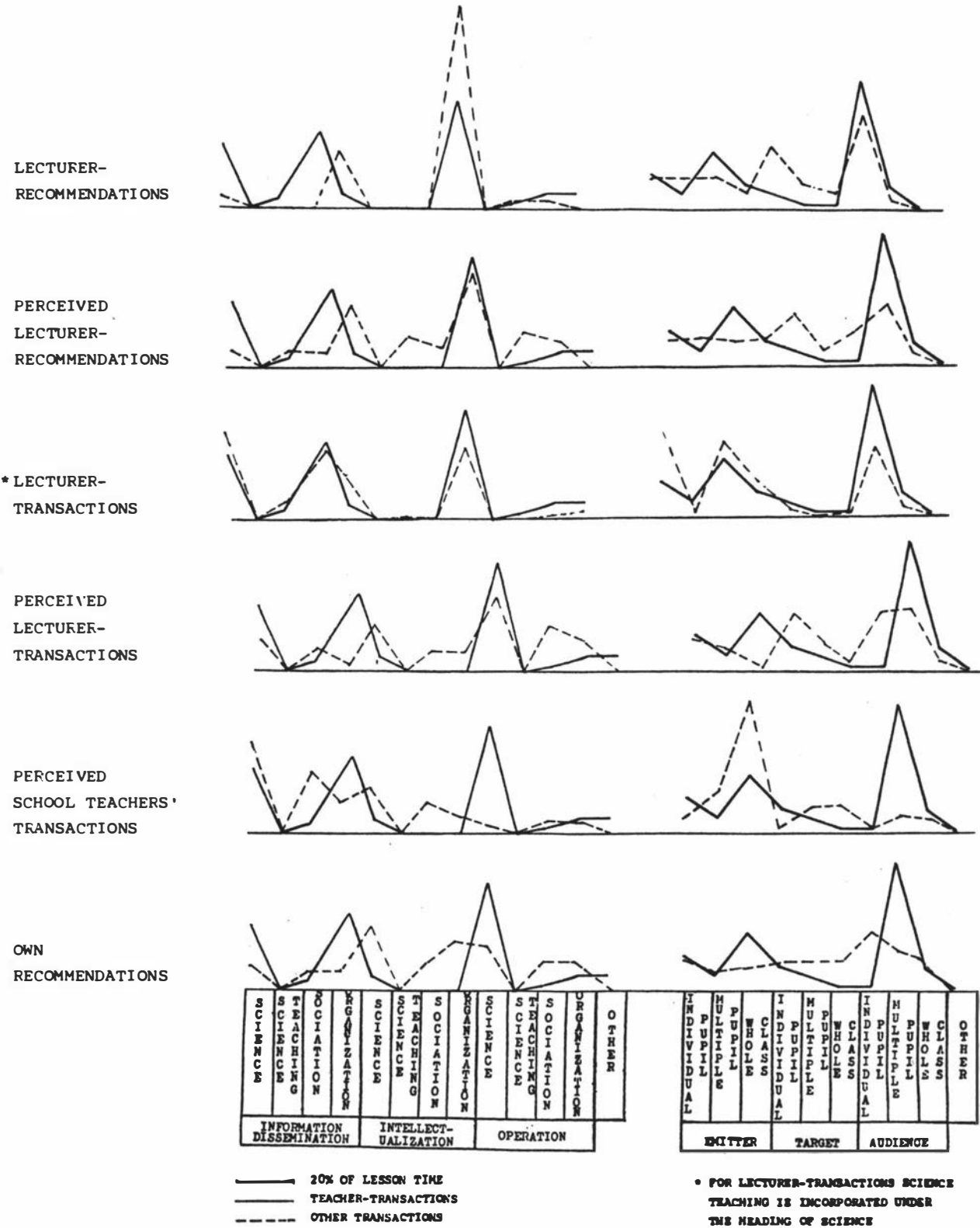
ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 10

a. Functional Transactions b. Structural Transactions



ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 11

a. Functional Transactions b. Structural Transactions

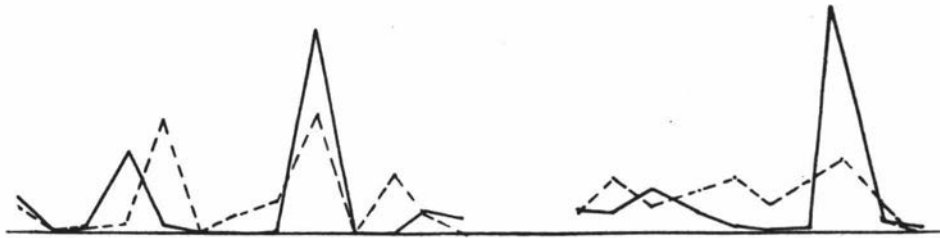


ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 12

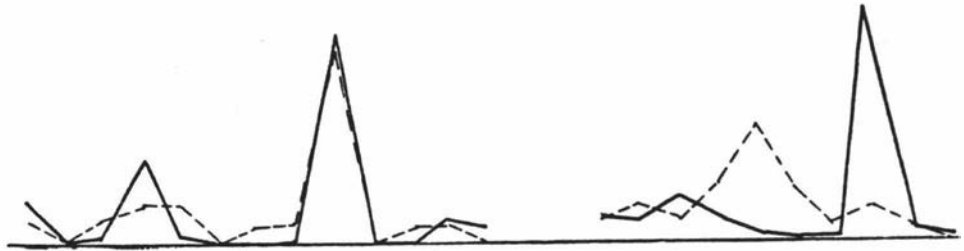
a. Functional Transactions

b. Structural Transactions

LECTURER-
RECOMMENDATIONS



PERCEIVED
LECTURER-
RECOMMENDATIONS



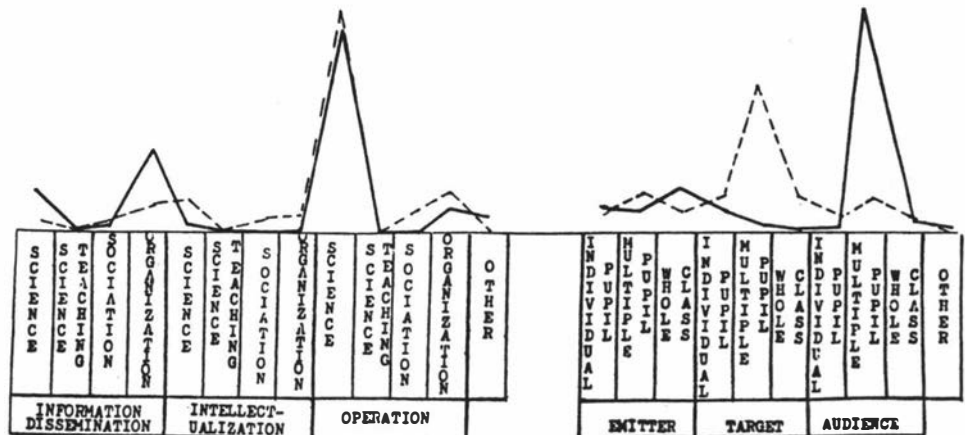
*LECTURER-
TRANSACTIONS



PERCEIVED
LECTURER-
TRANSACTIONS



PERCEIVED SCHOOL TEACHERS' TRANSACTIONS

OWN
RECOMMENDATIONS

===== 20% OF LESSON TIME
===== TEACHER-TRANSACTIONS
----- OTHER TRANSACTIONS

• FOR LECTURER-TRANSACTIONS SCIENCE
TEACHING IS INCORPORATED UNDER
THE HEADING OF SCIENCE

APPENDIX N

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 13

a. Functional Transactions

b. Structural Transactions

LECTURER-RECOMMENDATIONS

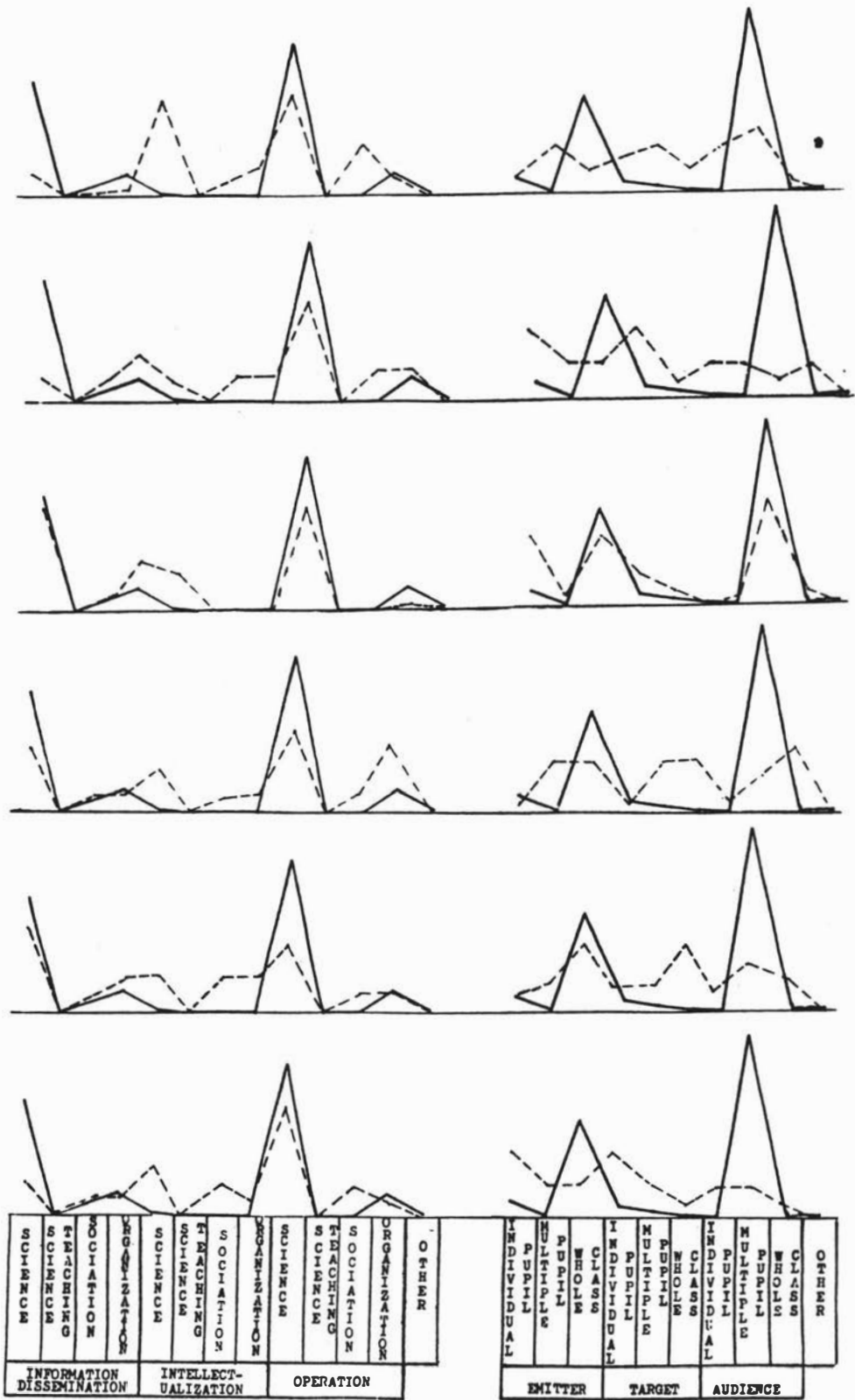
PERCEIVED LECTURER-RECOMMENDATIONS

*LECTURER-TRANSACTIONS

PERCEIVED LECTURER-TRANSACTIONS

PERCEIVED SCHOOL TEACHERS' TRANSACTIONS

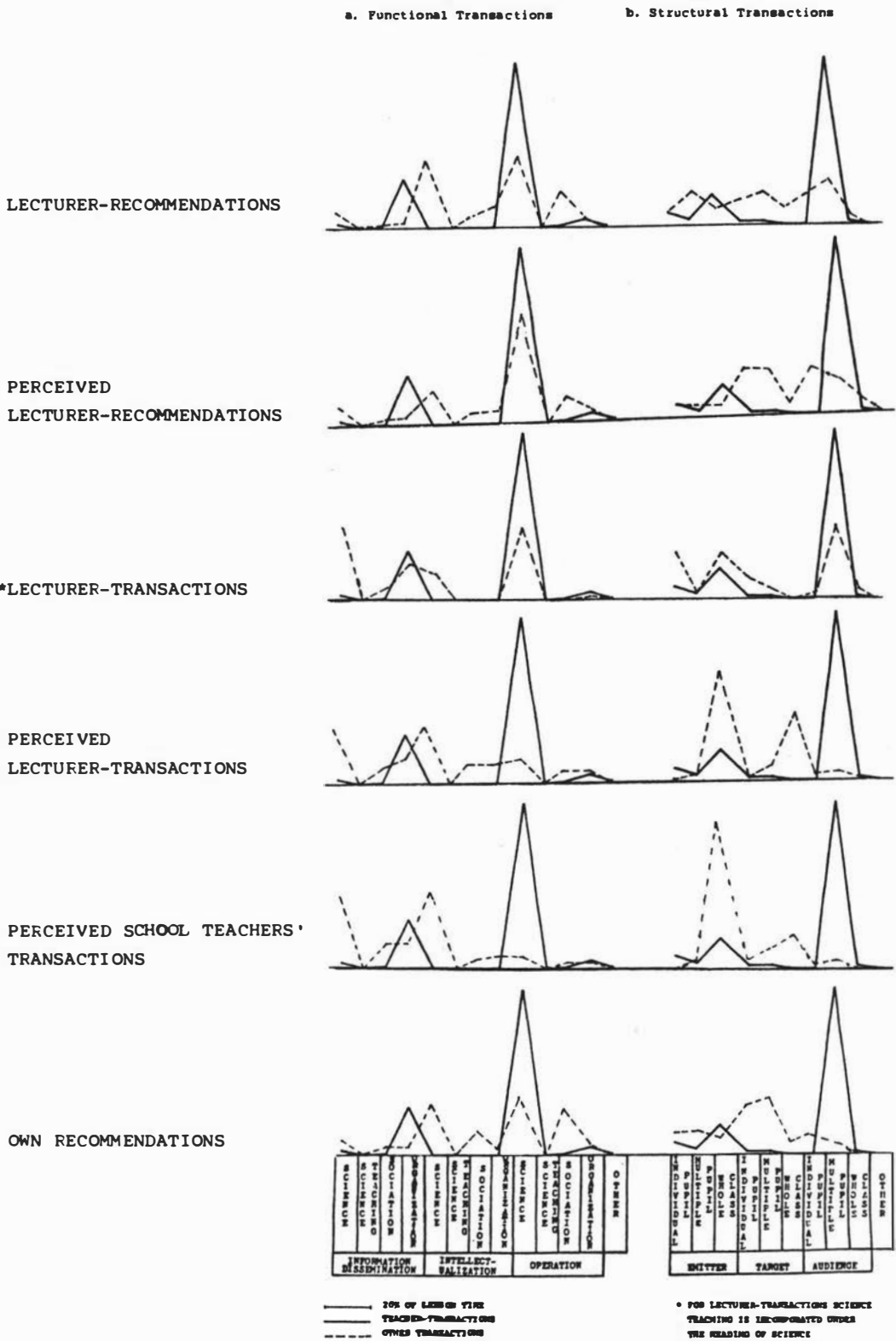
OWN RECOMMENDATIONS



———— 20% OF LESSON TIME
----- TEACHER-TRANSACTIONS
----- OTHER TRANSACTIONS

* FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 14



ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 15

a. Functional Transactions

b. Structural Transactions

LECTURER-
RECOMMENDATIONS

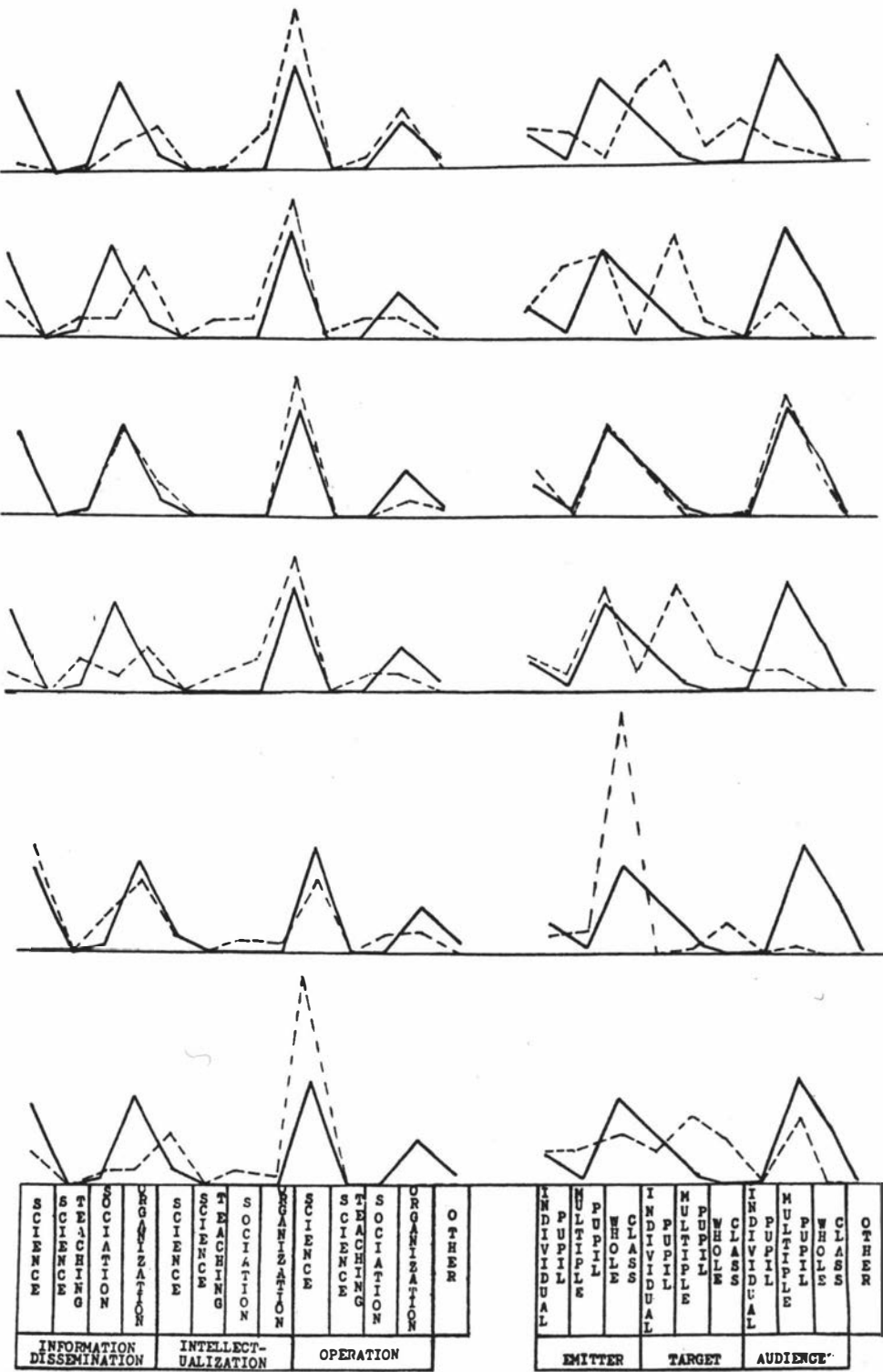
PERCEIVED
LECTURER-
RECOMMENDATIONS

*LECTURER-
TRANSACTIONS

PERCEIVED
LECTURER-
TRANSACTIONS

PERCEIVED
SCHOOL TEACHERS'
TRANSACTIONS

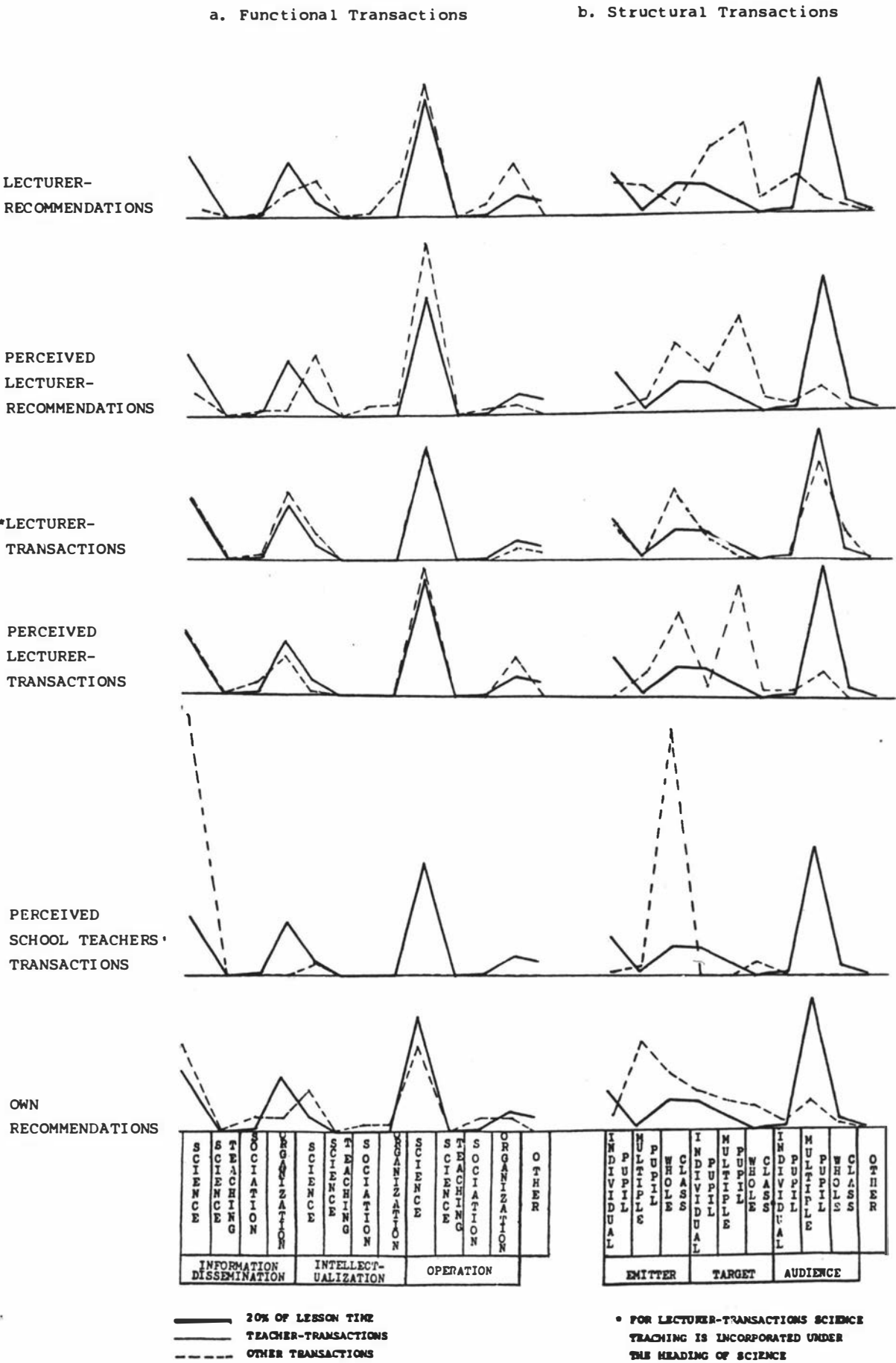
OWN
RECOMMENDATIONS



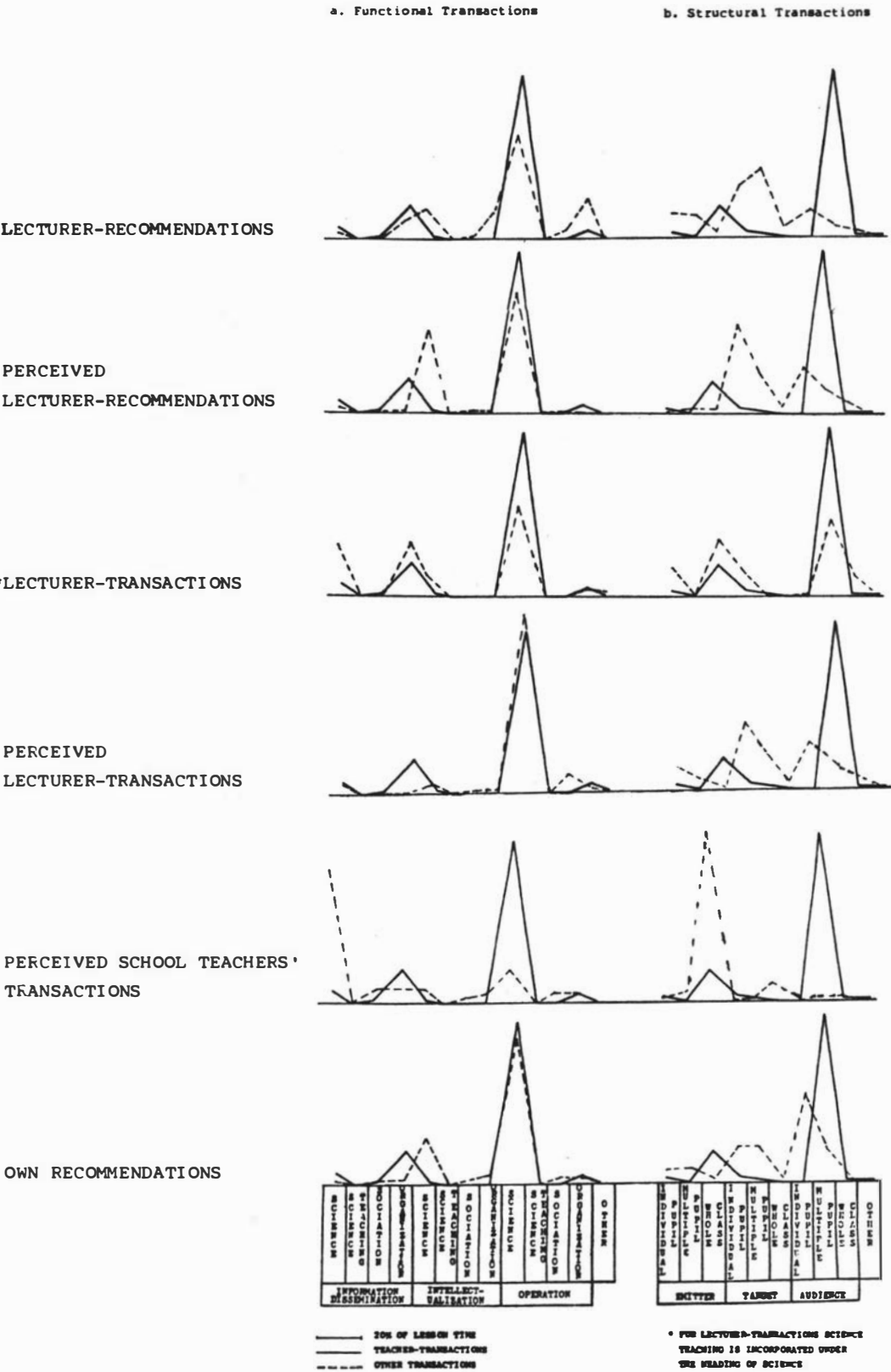
— 20% OF LESSON TIME
- - - TEACHER-TRANSACTIONS
- - - OTHER TRANSACTIONS

* FOR LECTURER-TRANSACTIONS SCIENCE
TEACHING IS INCORPORATED UNDER
THE HEADING OF SCIENCE

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 16



ACTUAL TRANSACTIONAL PATTERN VIS-A-VIS ALTERNATIVES: TEACHER 17



APPENDIX N

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 18

a. Functional Transactions

b. Structural Transactions

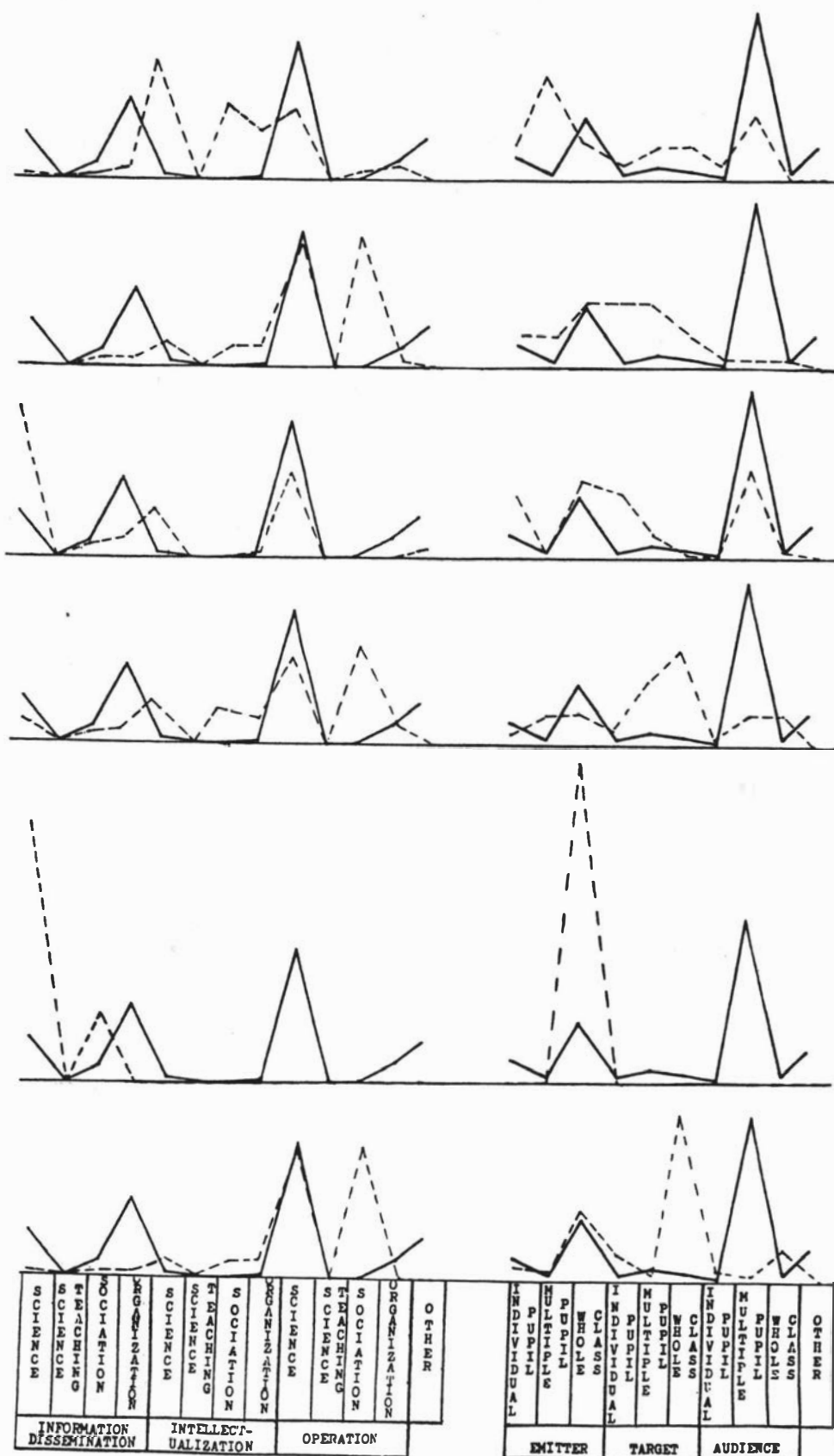
LECTURER-
RECOMMENDATIONS

PERCEIVED LECTURER-RECOMMENDATIONS

★LECTURER-
TRANSACTIONS

PERCEIVED
LECTURER-
TRANSACTIONS

PERCEIVED SCHOOL TEACHERS' TRANSACTIONS

OWN
RECOMMENDATIONS

20% OF LESSON TIME
TEACHER-TRANSACTIONS

• FOR LECTURER-TRANSACTIONS SCIENCE
TEACHING IS INCORPORATED UNDER

ACTUAL TRANSACTIONAL PATTERN VIS-À-VIS ALTERNATIVES: TEACHER 19

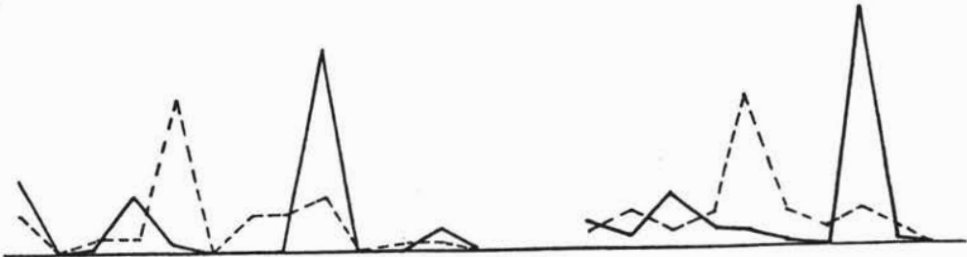
a. Functional Transactions

b. Structural Transactions

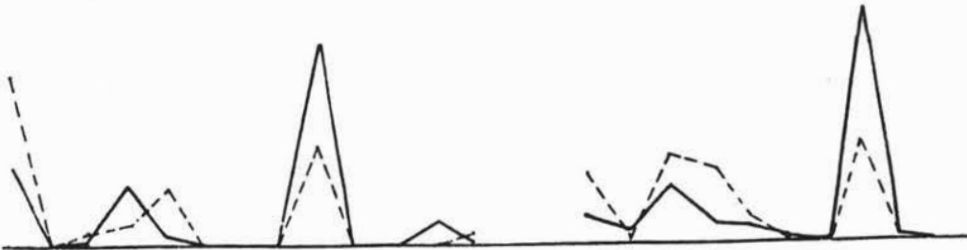
LECTURER-RECOMMENDATIONS



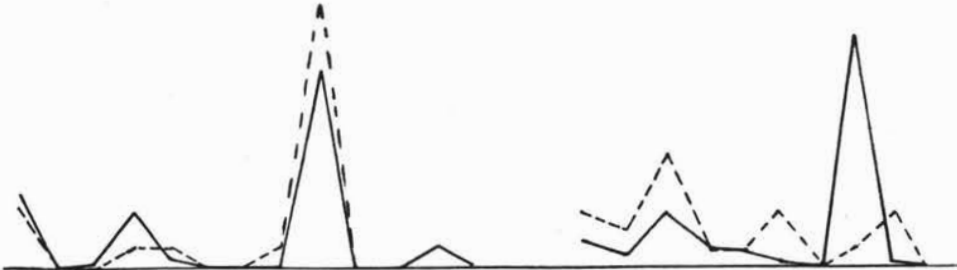
PERCEIVED LECTURER-RECOMMENDATIONS



*LECTURER-TRANSACTIONS



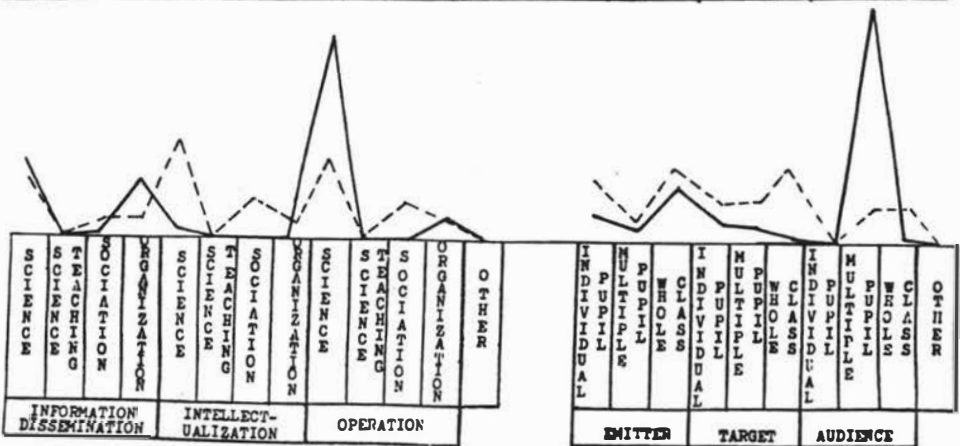
PERCEIVED LECTURER-TRANSACTIONS



PERCEIVED SCHOOL TEACHERS' TRANSACTIONS



OWN RECOMMENDATIONS



— 20% OF LESSON TIME
- - - TEACHER-TRANSACTIONS
... OTHER TRANSACTIONS

• FOR LECTURER-TRANSACTIONS SCIENCE TEACHING IS INCORPORATED UNDER THE HEADING OF SCIENCE

APPENDIX O

SCIENCE CURRICULUM PROGRAMME:

*OVERALL OBJECTIVES AND SAMPLE "HAND-OUTS"

	Page
Science Curriculum Programme :	412
Sample "hand-out" number 1: <u>Seminar on Teaching Skills:</u>	422
Sample "hand-out" number 2: <u>Science Is Safe:</u>	424
Sample "hand-out" number 3: <u>How to Prepare your Science Teaching Kit:</u>	426
Sample "hand-out" number 4: <u>How's my Programme going?:</u>	443

*Used by permission.



Science Curriculum



Science Department 79/5/3/1/

INTRODUCTION

Welcome to your science curriculum course. We look forward to working with you and helping you to prepare yourself for next year, when among, your other tasks, you will be teaching science.

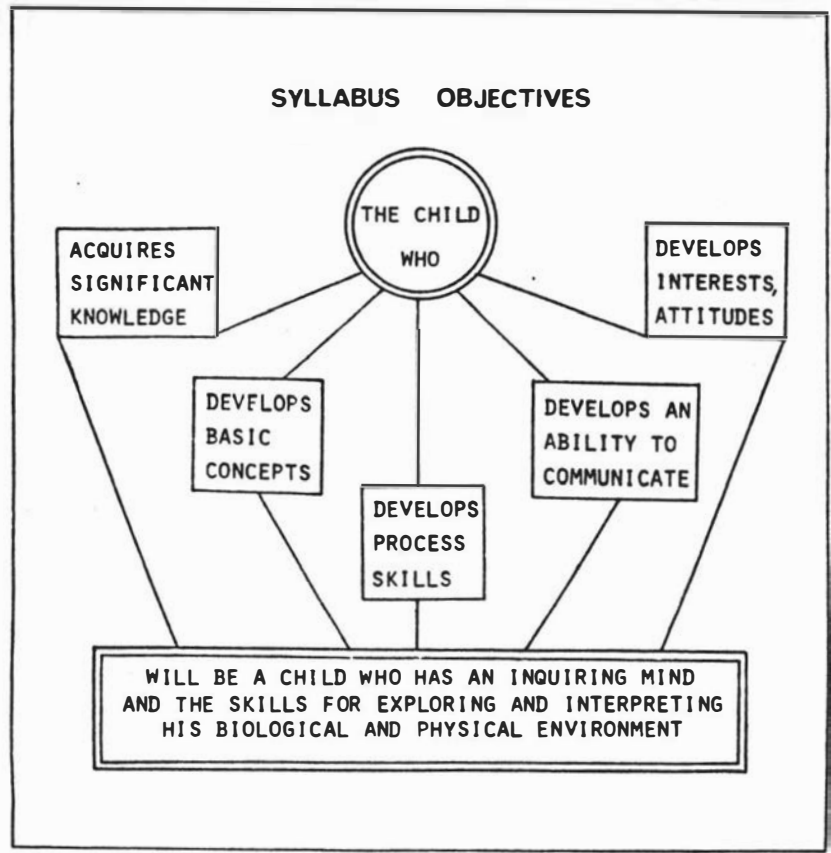
Some might greet this remark with trepidation or alarm, having had perhaps some less than satisfying memories of science in secondary school. If you're in this category, we expect you'll be surprised when you see the primary science syllabus with its strong emphasis on objectives very different from traditional ones, and begin to see the potential of sciencing (science is a verb ...) for children's intellectual development, interest and plain enjoyment,

Is it "science" we're talking about for primary children? Well, certainly we mean "exploring accessible environment", and "investigating skills". Scientists do this, and have these, yet sometimes "science" in school restricts the "accessible environment" to the pages of a text book or "the" apparatus and "experiments to prove", the very antithesis of investigative sciencing.

The structure of the course as at present planned (you may suggest changes) uses feedback from previous curriculum courses. Go over the objectives carefully. Is this the sort of course you feel you need at this stage? Let us know.

SCIENCE CURRICULUM PROGRAMME: CONTINUED

2.
PRIMARY SCIENCE SYLLABUS:
Infants to Standard 4



This diagram indicates the way in which the objectives of the science syllabus can be achieved

4.1 KNOWLEDGE

4.2 BASIC CONCEPTS

- Matter
- Energy
- Time and space
- Life

4.3 PROCESS SKILLS

4.4 COMMUNICATION

4.5 ATTITUDES

- | | | |
|--------------------|-----------------------------|----------------------------|
| 4.31 Observing | 4.42 Oral language | 4.53 Curiosity |
| 4.32 Measuring | 4.43 Written language | 4.54 Honesty |
| 4.33 Classifying | 4.44 Diagrams | 4.55 Suspended judgement |
| 4.34 Inferring | 4.45 Observational drawings | 4.56 Critical mindedness |
| 4.35 Predicting | 4.46 Tables of data | 4.57 Open mindedness |
| 4.36 Hypothesising | 4.47 Graphs | 4.58 Care of environment |
| 4.37 Experimenting | | 4.59 Care of living things |

SCIENCE CURRICULUM PROGRAMME:CONTINUED

1979 CURRICULUM 7 SCIENCE: TIMETABLE

3.

WEEK 7
Tuesday 3 July

1.30 Introduction

2.00 Workshop
What are these process skills?

An introduction to the information gathering skills by observation, measurement and classification of a group of animals.

Bring a mystery parcel.

Friday 6 July

Seminar 1: Mystery parcels

8.30 (a)
10.45 (b)

9.15 WORKSHOP Hey ho! Hey ho!
To investigate we go!

WEEK 8
Tuesday 10 July

Seminar 2: Paper's more interesting than you think.

1.30 (b)
3.30 (a)

2.15 WORKSHOP
Try the activities your peers have provided. Assign levels of difficulty in process skill practice, before handing in your card.

Bring an activity (+ card)
Identify levels of process skills

Friday 13 July

Seminar 3: Boats

8.30 (b)
10.45 (a)

9.15 WORKSHOP Try out activities.
Check 'levels' claimed.

10.00 Kits underway

WEEK 9
Tuesday 18 July

Seminar 4: "How do I make this activity open-ended? motivating?"

1.30 (a)
3.30 (b)

2.15 LECTURE (Lecture Room)
Process skills; what's appropriate?

2.45 WORKSHOP Kits

Winterfest

SCIENCE CURRICULUM PROGRAMME: CONTINUED

4.

WEEK 10 T.T.B.

Friday 27 July

9.00 Esplanade



11.00 } Investigation (on your own
approx } selected problem)

1.30 Communication skills through science.

You communicate your findings.....

Bring an open-ended activity and card

WEEK 11

Tuesday 31 July

1.30 All students. Lecture Room
Brian McConkey "Organising activities outdoors."

2.15 Kits in action.
Bring activities to trial.
Syndicates think up problems that need solving for kit activities.

Prepare for Seminar

Friday 3 August

Seminar 5: "How's my Programme Going?"

8.30 (a)
10.30 (b) 1 hour seminar today

9.30 WORKSHOP Kits continue
Build evaluation strategies into your kit.

Written part of kit due Tuesday.

WEEK 12

Tuesday 7 August

Seminar "Classroom Management"

1.30
3.30 1 hour seminar today

2.30 WORKSHOP Improvising

HAND IN THE WRITTEN PART OF YOUR KIT TODAY

Bring a resource review

Friday 10 August

Seminar 6: Resource Reviews

8.30 (a) (If not in seminar prepare
9.00 (b) your kit for display.)

Evaluation of Course.

Kits on display with enough gear to teach the kit with 30 children.

Peers evaluate all kits.

AIM

To initiate development of; your ability to help children learn from their surroundings, your belief that this is worthwhile, and your self-confidence that you can try it.

<u>OBJECTIVES</u>	<u>LEARNING ACTIVITIES INTENDED TO ACHIEVE OBJECTIVE</u>	<u>EVALUATION STRATEGY</u>
<p>We see the most important objectives as being development of your <u>ATTITUDES</u> in the following way. By the end of the unit you should feel:</p> <p>(1) confident of your ability to help children explore and learn from their surroundings</p>	<p>You'll prepare a teaching kit (or curriculum unit) you can use, and get ideas on activities, resources and techniques with your recent school experience fresh in your mind, you'll be able to imagine putting the things into practice next year.</p>	<p>Feedback from you. Anecdotal records.</p>
<p>(2) that science is especially worthwhile in the primary school;</p> <p>(a) It's a good base for provision of concrete experience necessary for intellectual development.</p> <p>(b) It's a base from which activities in other curriculum areas may develop. (e.g. central theme or topic in a "centre of interest" approach)</p>	<p>Discussion on this will pervade the course - culminating in the last seminar.</p> <p>Note the outside experiences and the opportunities you will find while developing your teaching kit.</p>	<p>Feedback from you, especially in the last seminar.</p>

SCIENCE CURRICULUM PROGRAMME: CONTINUED

<p>(c) It provides opportunity for achieving a wide range of worthwhile objectives. (Note process skills, communication skills and attitudes especially.)</p> <p>(d) Science is part of our culture.</p>	<p>Readings and discussion on objectives, communication skills and inclusion of these objectives in your teaching kit.</p> <p>Which is more influential on our daily lives; science and its products - or money?</p>	<p>6.</p>
<p>(3) Teaching and learning about our own environment is enjoyable and interesting.</p>	<p>We expect you will enjoy your experiences in this course - you'll contribute to this for others in the course.</p>	<p>Let us know!</p>

YOUR OWN PROCESS SKILLS

Your ability to observe, classify infer, predict, measure and hypothesize should improve during the course.

First three seminars.
Some experience during first three workshops.
Investigations.

Tutor observation (using checklist).

Inferring for example:

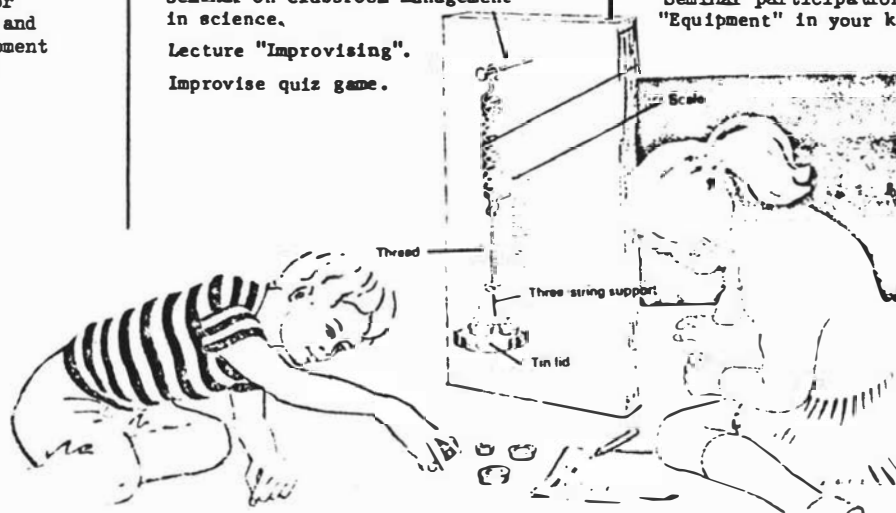


UNDERSTANDINGS

At the end of this unit you shall be able to:-

(1) discuss the aims and objectives for the teaching of science in the primary school, and indicate criteria for the selection of worthwhile objectives	Handout reading/exercise. Development will occur during development of teaching kit. Final seminar.	Seminar participation/tutor observation Possible extra assignment for doubtful cases.
(2) Define and give examples of the process skills listed in the primary science draft syllabus and explain the concept of "levels of difficulty" with respect to process skills	Workshop on process skills. Read extracts from primary science syllabus. Work on teaching kit. First three seminars and workshops.	Tutor observation. Assessment of the teaching kit.
(3) write objectives for a science teaching kit according to criteria suggested in the handout provided during this course.	Work during preparation of teaching kit.	Assessment of teaching kit.
(4) locate and select or invent several activities suitable for use in achieving an objective you select as worthwhile.	Preparation of teaching kit.	Assessment of teaching kit.
(5) give examples of questions you could use to encourage process skill development.	First three seminars. Workshop session involving peer teaching. Openended activities.	Tutor observation. Evidence in kit.
(6) explain and give at least two examples of, evaluation techniques suitable for evaluation of attitude change, skill development and development of understandings.	Evaluation instruments used in this course other areas of your own work. Workshop on evaluation in your teaching kit. Some aspects of the questioning work.	Assessment of teaching kit.

(7) List several resources available to you for development of a science programme next year, and comment on at least one in depth.	Use of resources during preparation of your kit. You may be asked to provide a resource review.	Evidence in teaching kit. Tutor observation.
(8) suggest types of activities appropriate for helping children think operationally - and discuss the similarity between this general aim, and the development of science process skills.	Unscheduled discussions. Lecture "Process Skills and Piaget".	Tutor observation.
(9) given a science activity suggest and demonstrate ways of using it to develop children's communication skills.	Communication skills handout. Workshop following Esplanade visit.	Participation, in workshop. Assessment of teaching kit.
(10) describe several strategies for making "apparatus" from junk, and storing and distributing equipment to be used for pupil activity.	Seminar on classroom management in science. Lecture "Improvising". Improvise quiz game.	Seminar participation. "Equipment" in your kit.



YES THAT'S ALL FINE BUT

WHAT DO WE HAVE TO DO TO PASS THE COURSE?

We think you will demonstrate sufficient achievement of the objectives of the course if you:-

- (1) Bring an activity (- with the process skills it involves children in practising, identified) for each of the first four workshops.
- (2) Participate in seminars and investigations.
- (3) Be a contributing member of a syndicate that produces a teaching kit which meets most of the criteria on the assessment checklist which will be provided.

(We suggest you supply an 8cm x 12cm (approx.) card with your "equipment" with instructions on one side and process skill objectives on the other. The class level it's intended for should be stated and it should span at least 5 minutes of time.)

See the example "card" on the back of this page.

YOUR ACTIVITY CARD - An Example

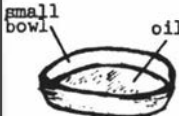
Here's the front and reverse sides of the sort of activity card you should bring to the workshop. Suggested size 8 cm X 12 cm approx.

Don't forget the equipment as well.

FRONT SIDE

WHICH WICK WORKS?

Make a "lamp" like this.



Try making wicks with the materials provided. Divide them into two groups; those that keep the lamp burning, and those that don't.

When you have sorted the materials, study each group carefully. What similarities are there? What differences between the groups? Jot down your observations.

NOTES

Communicate the activity as well as you can. Use a diagram for preference.

The activity should take someone about 5 minutes.

The language you use can be for your peers rather than children if you wish.

REVERSE SIDE

NAME: I. Student

THEME: "Liquids"

Appropriate class level: S2-3

Process skills being practised.

Classification: (grouping the materials according to whether or not they make a good wick.)

Observation: (studying the materials in each group closely.)

NOTES

- (1) We'll give you a "theme" for each card.
- (2) This should show the class level you would use the activity with to achieve the practise in process skills you have listed.
- (3) For your third card we'll get you to identify the level of the process skill being practised as well. More on that later.

SAMPLE "HAND-OUT" NUMBER 1*Seminar on Teaching Skills*

The objective of this seminar is to identify three teaching skills we've selected as being particularly necessary for success in teaching primary science. Later you'll have the opportunity to practise and observe them in peer groups before practising them on section.

Here's an activity copied from Schmidt and Rockcastle "Teaching Science with Everyday Things" - and some information on how two teachers used it.

**LADDER
FOR LIQUIDS**

In "Holey Scow," water was observed to cling to itself, or *cohere*. However, many liquids, including water, also stick to other materials, or *adhere*. Depending upon their abilities both to cohere and to adhere, they often do interesting

things such as climb inside slender tubes, creep up or down the sides of containers, and soak into porous materials. Besides being useful in lamp and candle wicks, sponges, and soil this climbing or *capillary* action provides an intriguing matter to investigate.



Let each pupil in a group cut a 10-inch strip from different materials such as cloth, paper towel, and corrugated cardboard, and tape one end of each to a ruler resting across two books standing on end. Then have each pupil fill a paper cup with water to which some food coloring has been added for visibility. At a signal let them all put their cups under their strips and observe how the water climbs. *In which strip does the water rise fastest? In which has it risen farthest after five minutes? After a half hour? What differences can be observed if kerosine is used in place of water? If salad oil is used? Rubbing alcohol?*

Now let each group compare, as follows, the rate at which water moves up, and then down, liquid ladders. Fill a cup with colored water and set it on another cup, which has been inverted. Cut several equal-size strips, as before, long enough for one end to dip into the full cup and the other end to dangle into an empty cup below. Make a point on the dangling end. Put the strips in place and watch what happens.

Through which of the strips does the water soak to the point? Does the water stop moving in a strip when it has soaked to the point? At the end of a half hour, what has happened in the empty cups? The full cups? What will happen if they are left overnight? What explanation can be offered for what is observed?

1. Questioning

Both decided to let the children do the activity in groups and each went round the groups in his class. Below we show what each teacher said as he approached each group. The children's contributions have been omitted.

TEACHER 1	TEACHER 2
<p>1st group Whet have we here? Whet cloth is that? Can you see the water going up the blotting paper? Seems to be going up the cotton cloth faster doesn't it?</p>	<p>What can you see happening? Which one seems to be fastest? What about the sacking, any progress there? Do you think it will reach the top? Which one do you think will reach the top first?</p>
<p>2nd group What cloth is that? Faster for the blotting paper I see - - did <u>you</u> see that? You could have been more careful here - all these strips should be the same width. You'd better try it again.</p>	<p>Which one seems to be faster here? How much further has the water gone up the blotting paper than up writing paper? I see this strip here is wider than this one. Do you think that could be the reason it's faster? What are you going to do?</p>
<p>3rd group Oh I see that one is absorb- ing water faster here. Do you think the fibres in this one are closer together than this one? Use your magnifying glass. I think you'll find the closely packed fibres don't absorb very quickly ... is that right do you think?</p>	<p>I see you have chosen three different cloths. Looking at what's happened there now, which cloth would you choose to make a raincoat out of? Why? Can you see any differences in the cloths - this one, the one that absorbs water faster, and this one - can you see any differences? Do you think that could affect the water going up?</p>
<p>4th group This is a good one. Have you filled out your work cards? Done the calculations?</p>	<p>How far have they gone? Which is faster? How fast is it going up? Is there some reason for it to go up faster?</p>

Now, questions for you. Which teacher understands process skills? Which questions encourage process skills practice?

2. Providing an introduction through an open-ended problem

How would you get this activity started and keep it going?

3. Organisation

How would you organise class into groups who will be working on the investigation?

APPENDIX O: CONTINUEDSAMPLE "HAND-OUT" NUMBER 2

With common sense it certainly is. Burns (or scalds), cuts and poisonings are possible - but with a common sense appreciation of the possibility, most unlikely.

Good organisation; warnings to the children of the potential dangers; rapid and effective dealing with any potentially dangerous misbehaviour are fairly obvious measures to reduce the possibility of injury.

Sometimes its possible to substitute less hazardous alternative equipment or chemicals e.g. tins rather than thin jars for an activity outside; candles rather than burners for small children; non poisonous substances only.

What would you do if:

1. One group drop and break their spirit burner and the meths catches alight on the floor.
2. A kerosene burner suddenly squirts flaming kerosene all over the desk it's standing on.
3. The class is about to use thermometers for the first time.
4. A boy drops and breaks a mercury thermometer.

SAMPLE "HAND-OUT" NUMBER 2:CONTINUED

The Department of Education's booklet "Safety in School Laboratories" is available to all teachers.

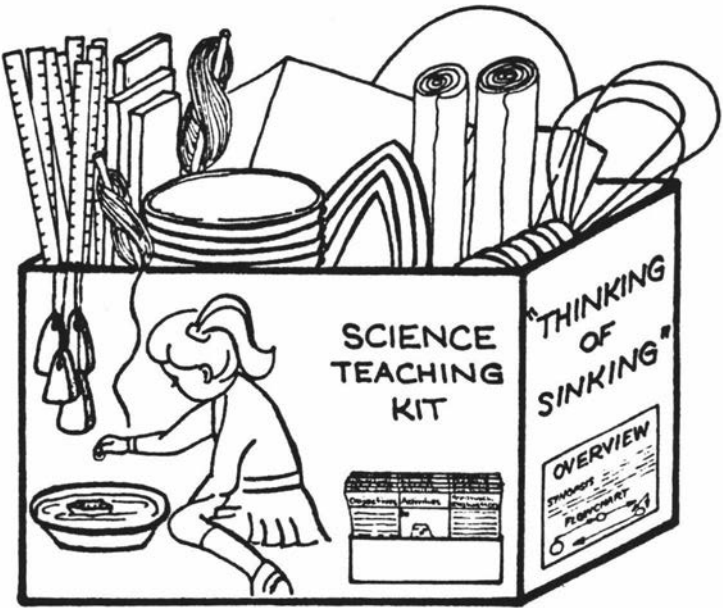
Though it's mainly relevant to secondary school laboratories it's a useful reference for all.

5. The class has been using razor blades and in spite of your exhortations to be careful one girl has cut her hand quite deeply.
 6. A boy puts his hand on the hot plate and burns it, and a girl's dress catches alight on a meths burner, and all the children crowd around saying 'Ooh, Mary's dress is on fire!' and 'Miss or Mr-----, John's burnt his hand!'
 7. You see Jenny raise the 'unknown white solid' to her lips to taste it.
 8. You are going to use petrol or some other volatile solvent during a class activity.
 9. Carbon tetrachloride is recommended for an activity by the resource book you are using.
- So are caustic soda and benzene (note not benzine which is sometimes used as a name for petrol.)

10. You have been lucky enough to get car batteries for your electricity unit. What precautions are necessary?
11. The sales rep. offers you a cheap system for doing electricity experiments. "Just plug it in," he tells you "And everyone has an outlet they can use. Quite safe - only a small current you see".
12. John says "Hey I got a shock from that switch. You try it Mary".



HOW TO PREPARE



YOUR SCIENCE TEACHING KIT

PREPARATION OF TEACHING KIT: CONTINUED

2.

**HOW TO PREPARE YOUR SCIENCE
TEACHING KIT**

What is a teaching kit?

It's a box containing a curriculum unit and a set of the equipment required to teach it.

Any teacher should be able to pick it up, and begin using it with her/his class the next day.

Think of it this way - if you were buying a teaching kit - something the seller guaranteed would be "all you need to teach science with for 3 weeks!", what would you want to find in it?

Our answer includes; an overview plan, objectives, activities, suggestions for motivational strategies, evaluation instruments, and lists of equipment and resources, as well as equipment itself. A checklist will be provided in which these items have been detailed, so you can check out your kit before presenting it.

How do you begin - and then proceed?

We'll help your syndicate through the first few steps in the series of steps listed below, in the first session; then further progress will be organised within your syndicate.

The format we want you to use may be new to you, but you will probably find that it, and the stepwise approach, help your syndicate to think clearly and produce a high quality teaching kit that you'll want to use next year.

The steps you will go through are listed below and followed by an example, a kit produced by 'John and Shirley'.

**SUMMARY OF STEPS
IN PRODUCING A KIT**

STEP 1

Select a topic from
the list provided



STEP 2

Brainstorm!



STEP 3

(a) Isolate ideas from your
brainstorming that seem to lead
to activities for children.

Arrange these into a rough
flowchart.

PREPARATION OF TEACHING KIT: CONTINUED

3.



RESOURCES ↔



STEP 8

Rearrange or add to the activities, so that the children practise communication skills while doing them. Write communication skill objectives in column 1. Add any extra parts to the activity in Column 2.

Reject any activities that are inappropriate for this.

STEP 4

Sort out any essential understandings or knowledge the children ought to gain from the kit. Jot these down now, but write them up formally in Step 11.

STEP 5

Select activities (more than enough) Remember, science provides first-hand experiences



STEP 6

Draw up a three column format, with activities (one per page) in column 2



STEP 7

Devise ways for children to practise process skills using the activities you've selected. Reject any activities you can't use for practising process skills. Write process skill objectives in Column 1. Add organisational strategies to Column 2

STEP 9

Suggest motivational strategies, preferably for each activity.

PREPARATION OF TEACHING KIT: CONTINUED

STEP 10

Fill in column 3 by indicating what technique will be used to assess each child's progress in or achievement of each objective listed in Column 1 - and suggestions for collecting feedback during the activity.

OBJECTIVES	ACTIVITIES	COLLECTING INFORMATION FOR EVALUATION
Column 1	Column 2	Column 3

STEP 11

Now you've got all the activities settled, check the knowledge/understanding objectives from Step 4. Are they still appropriate? Amend as necessary and write up on a separate page in the three column format.

STEP 12

Refer to the syllabus kit of attitude objectives.

Select one or two attitude(s) which could be developed while using your kit. State just how the child's attitude will change, and derive a list of behaviours that would show the change.

Write up on a separate page in the three column format.

STEP 13

Develop evaluation instruments according to the requirements you have listed in Steps 10, 11 and 12

STEP 14

Make up equipment lists, and collect and store the gear.

STEP 15

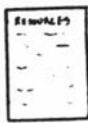
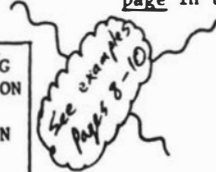
Write a list of resources used during the preparation of your kit.

STEP 16

Prepare the overview comprising a synopsis or rationale plus a flowchart showing the order in which activities are to be done, and how they relate to each other.

STEP 17

Package kit and present for display.



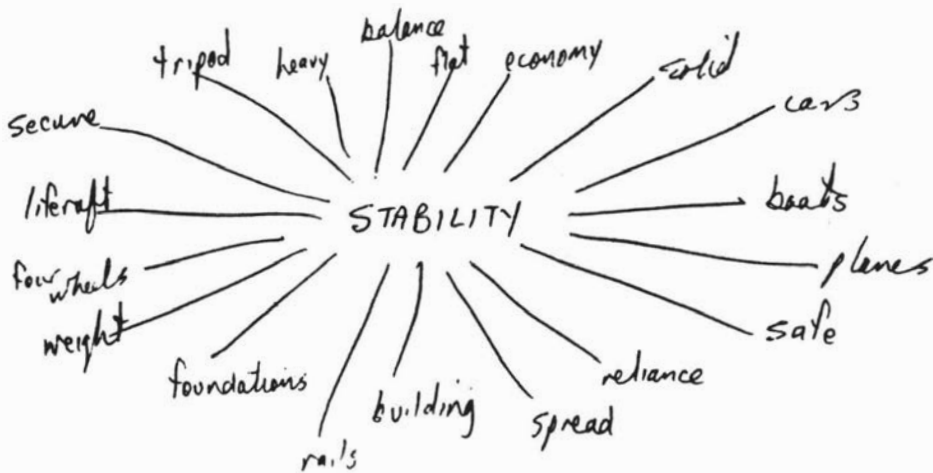
5.

AN EXAMPLE
JOHN'S AND SHIRLEY'S TEACHING KIT
ON 'STABILITY'.

Like you, John and Shirley became a syndicate in a Science Curriculum Course.

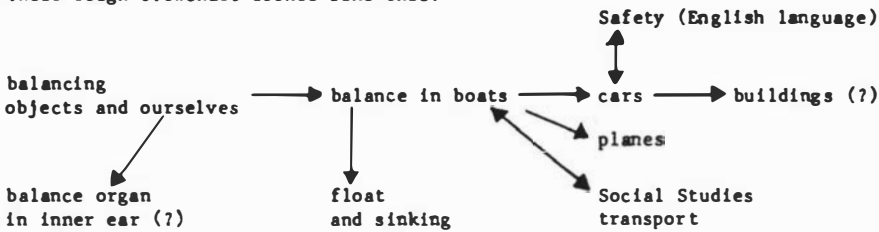
Step 1 & 2

John and Shirley chose "Stability" as their topic and the result of their brain-storming session looked like this:-



Step 3

Their rough flowchart looked like this:-



While drawing up this flowchart John and Shirley kept these two questions firmly in mind:-

What topics will appeal to children?
What topics lend themselves to providing children with first hand ex eriences?

Select topics that meet these criteria.

PREPARATION OF TEACHING KIT: CONTINUED

6.

STEP 4

They decided an understanding that "lowering the weight in a vehicle makes it more stable - (less likely to tip)" is essential, or very helpful to all children.

As a behavioural performance objective it became:

When this unit has long been completed, the children will still be able to:- relate the principle "the lower the weight the more stable a vehicle", to design and loading of boats, planes and land vehicles and identify weight in the upper part of a vehicle as a possible reason for it tipping.

Now we've a guide for selecting at least some of the activities.

Step 5



That initial activity was causing problems - but John looked up "Science for Toys" (one of the Science 5/13 set) and on P.28 came across the "cork man" activity (see diagram in the three column format below.)

They found and invented various other activities - but these won't be listed here.

Perhaps you could suggest some appropriate ones?



Step 6


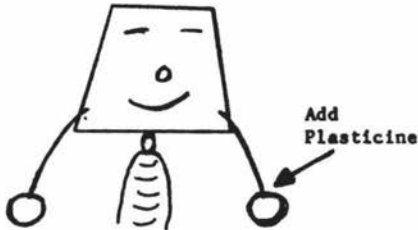
We move to the three column format across a full A4 or foolscap page. The objectives / activities / evaluation for this Science Curriculum course follow this format. (That's the handout you received at the beginning of the course.)

Only one activity from John and Shirley's unit is shown, although several other of their activities contribute to the achievement of the knowledge/understanding objective they have chosen.

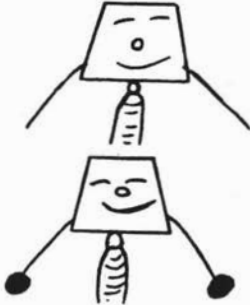
John and Shirley's step 6 is on page 7.

Steps 7 - 10


John's and Shirley's efforts in these steps appear on page 8.

Objectives (including skills being developed)	Activities designed to achieve objectives. (Include key questions and suggestions for motivational strategies.)	Collecting Information for Evaluation
<p><u>Notes on the use of this column:</u></p> <p>(1) It's possible to organise <u>most</u> activities that involve hands-on work for children so that some process skill is practised.</p> <p>But it's also possible to organise them so that <u>no</u> process skill is practised.</p> <p>Therefore process skills you claim will be developed (and therefore list in this column) should be justified by the organisation and key questions in Column 2.</p> <p>(2) For the syllabus list of Communication Skills refer to Appendix 1 of this handout.</p>	<p>STEP 6</p> <p>(a)</p>  <p>(b)</p>  <p>Add Plasticine</p> <p>This page shows Step 6. John's and Shirley's efforts on Steps 7 - 10 are shown on the next page.</p>	<p><u>Notes on the use of this column:</u></p> <p>(1) <u>Questions</u> the teacher is to ask during a lesson should be in the <u>activities</u> column. If the responses to such questions are part of the planned assessment of children's progress write briefly in this column what kind of response indicates evidence of achievement of the objective, and how this is to be judged and recorded for <u>each child</u>.</p> <p>(2) Each objective listed in Column 1 has corresponding entries in this column.</p> <p><u>Omit</u> any objective you have no way of collecting any information about.</p>

7.

Objectives	Activities	Collecting Information for Evaluation
<p>Step 7</p> <p><u>Process Skills practice</u></p> <p><u>predicting</u> level 1 (each group answers key Q.1.) Predict what happens when the plasticine is moved up the wire</p> <p><u>inferring</u> (level 2) (each group answers key question 2) i.e. may infer weight affects stability in some way</p> <p>(level 4) offer several inferences about making the men even more stable (Key question 3)</p> <p><u>hypothesising</u> some children may state a relationship between position of weight and stability</p> <p>Step 8</p> <p><u>Communication Skills practice</u></p> <p><u>oral</u> (group discussion of problem)</p> <p><u>diagrams</u> sketches of cork man (see tasks)</p>	<p>STEP 9</p> <p><u>Motivational Strategy:</u> Teachers challenge children to try balancing the cork man with no "boots" on.</p> <p><u>Organisation:</u> Class in pairs each pair issued with a cork and wires.</p>  <p>Step 7</p> <p><u>Key Questions</u></p> <ol style="list-style-type: none"> (1) What do you predict will happen if the plasticine is moved up the wire? Write this in your book. (2) What would happen if you take half the plasticine off? (3) Can you think of ways to make the men even more stable? <p>Step 8</p> <p><u>Tasks:</u> Draw a series of diagrams in your book to show how you made the cork man more and more stable.</p>	<p>STEP 10</p> <p><u>Suggestions for getting feedback</u></p> <p>Teacher to circulate round groups while working. Encourage and check written answers to key questions. (Stimulate further prediction and inference.)</p> <p>Call on several groups to report their predictions and inferences to class.</p> <p><u>Assessing Children's Progress</u></p> <p><u>Process Skills:</u> See test (P 13) for assessment of each child's <u>predicting</u> and <u>inferring</u> abilities</p> <p>Record any hypotheses made on anecdotal record cards. (Advanced at this level.)</p> <p><u>Communication Skills</u></p> <p>Use checklist (see P 12) for noting oral communication; activity 8 requires a verbal report to class. Teacher could choose children you are not sure about, then fill in checklist</p> <p><u>Diagrams</u> Collect "letters" written in Activity 8 showing diagrams of a dart. Assess using the criterion: "Do the diagram(s) communicate to a novice how the weight is distributed?"</p>

Step 11

Objectives	Activities Related to this Objective	Evaluation Strategies
<p>After this unit has been completed the children will be able to:</p> <p>relate the principle "the lower the weight the more stable a vehicle" to design and loading of boats, planes and land vehicles and identify weight in the upper part of a vehicle as a possible reason for it tipping</p>	<p><u>Activity 1:</u> (Balancing cork man)</p> <p><u>Activity 2:</u> (Balancing on a wall, then using two buckets to help balance)</p> <p><u>Activity 4:</u> Nutshell boats</p> <p><u>Activity 7:</u> Loading planes</p> <p><u>Extension Activity 10:</u> Safety posters on loading vehicles</p>	<p>The following problems will be given a week after the unit finishes, as part of a quiz or "problem session" also involving maths and social studies problems.</p> <p>1. </p> <p>There are three kinds of cargo to be loaded into this ship, iron bars, timber and cases of feathers. Show where you would load them.</p> <p>Give your reasons.</p>

PREPARATION OF TEACHING KIT: CONTINUED

STEP 12

10.

John and Shirley looked up the attitudes listed in the Infants to Standard 4 Syllabus. They decided they could, through their unit, contribute to the development of the children's attitudes of curiosity and suspended judgement.

To be more specific about how their kit contributes to the development of these two attitudes, they stated their attitude objectives like this.

At the end of this unit the children will feel that:-

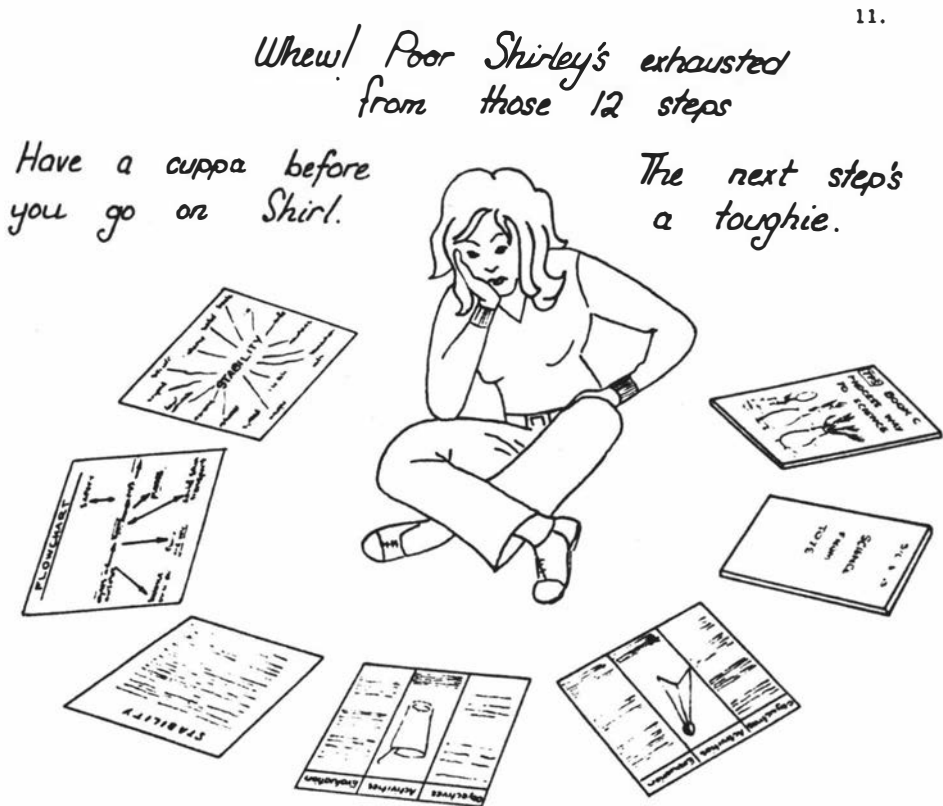
* they want to know more about design and loading in trucks, planes and boats (derived from syllabus objective "Curiosity")

* when making inferences, it is desirable to think of more than one possibility, and not jump to conclusions (derived from syllabus objective "Suspended Judgement")

Now, into the three column format. Only the second of their attitude objectives is shown here in this format.

Attitude Objective	Experiences in the Unit Likely to Develop the Attitude	Evaluation Strategy
<p><u>At the completion of this unit the children will feel that:-</u></p> <p>when making inferences it is desirable to think of more than one possibility, and not to jump to conclusions.</p> <p><u>This attitude may be demonstrated by the child:-</u></p> <p>* seeking evidence to support his own or a given inference</p> <p>* correcting another child who jumps to a conclusion</p> <p>* suggesting an alternative inference or suggesting that some other possibility may exist</p>	<p>Children will, in a number of activities, be encouraged to support inferences with evidence, and report their groups inferences to the class.</p> <p>The children in groups, will be encouraged to question other groups inferences.</p> <p>"But it could be" statements will be reinforced.</p> <p>(<u>Note on the use of this column</u>)</p> <p><u>Style of teaching</u> rather than particular activities, contributes to attitude change. Thus the comment in this column is advice to the teacher on style or strategies appropriate to the enhancement of the attitudes sought.)</p>	<p>Checklist</p> <p>Teacher to observe for behaviours listed in Column 1 and tick the appropriate box in the checklist (see P 12) if the child demonstrates the behaviour.</p>

PREPARATION OF TEACHING KIT: CONTINUED



Step 13

John and Shirley have created quite a task for themselves in this step. In Step 10 they promised a test to assess the children's inferring and predicting skills. The other process skills they list as objectives are observing (which is assessed using the checklist on P 12) and hypothesising (which would be advanced for their classes level). They would make a separate note of any hypothesising done by a child (i.e. an anecdotal record). See the anecdotal record card below.

Communication Skills also feature in Step 10. Oral communication is to be assessed using the checklist (careful wording needed here - what is good oral communication)? and the diagramming skill is to be marked by the teacher (see note and criterion on P 8)

In Step 11 they've already dealt with assessment of the knowledge/understanding objective, but in Step 12 they have mentioned a checklist again. (Their checklist appears below.)

They have found (and no doubt you will too) that a range of strategies is necessary to assess achievement of all their objectives, and this is an essential part of collecting the necessary information for evaluation.

PREPARATION OF TEACHING KIT: CONTINUED

12.

Checklist:

For noting behaviours related to achievement of observing (level 3) oral communication, and attitudes listed as objectives of this unit. Use after each session. Check behaviours noticed.

Behaviour noticed	Allan	Barry	Carol	Dora
<u>OBSERVING</u>					
Described a movement accurately to others (observing level 3). (Activities 2, 4, 5, 6)					
Diagrams drawn show good observation (at level 1, 2) (Activities 4, 8)					
<u>ORAL COMMUNICATION</u>					
Spoke clearly and fluently to others.					
Clearly had planned what he/she said.					
Gave a comprehensible account of an event or a procedure to others.					
* Evidence of understanding listener's viewpoint (able to "role-take")					
<u>ATTITUDES</u>					
Actively sought evidence to support his own or a given inference.					
Corrected another child who jumped to a conclusion.					
etc					

PREPARATION OF TEACHING KIT: CONTINUED

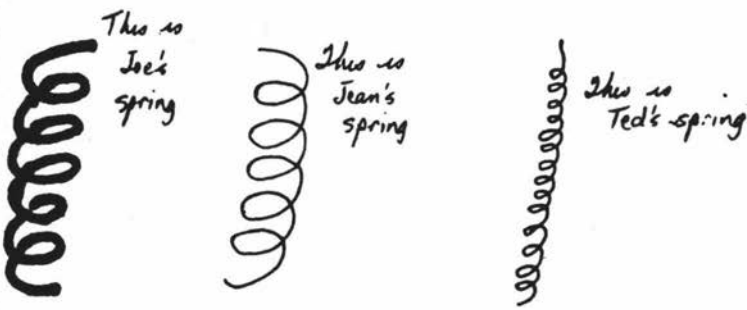
13.

Test

For use in assessing the children's levels of inferring and predicting. (Don't forget, this test is for collecting information; how it's interpreted and used is up to the user.)

For classes including children with reading difficulties administer the test verbally; demonstrate using actual springs.

ITEM 1. (Inference level 3 and level 4)



They are all the same length. (10 cm)

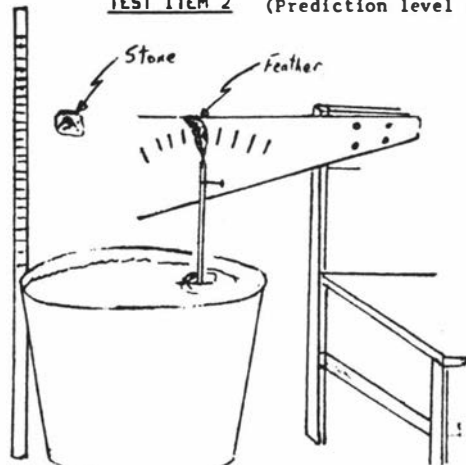
Joe tied a weight to his spring and the spring stretched to 20 cm. When Ted tied the same weight to his spring it stretched to 30 cm. "Ah" said Ted "That's because my spring has more coils than yours Joe."

When they tied the weight to Jean's spring it stretched to 35 cm.

Do you think Ted was right about the springs?
Explain your reasoning.

Can you suggest two possible reasons why Jean's spring stretched more than Joe's?

TEST ITEM 2 (Prediction level 2)



Jimmy invented this method of moving the feather without touching it. When the stone is dropped in the water the feather moves.

PREPARATION OF TEACHING KIT: CONTINUED

14.

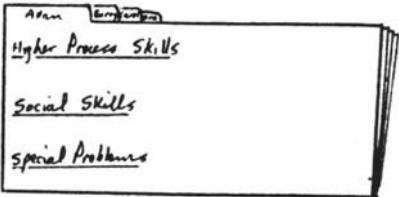
Jimmy's class had been investigating "moving without touching",
He wondered
what happened when you dropped the stone from higher up,
so he tried it. Here are his measurements.

Height I dropped the stone from	Number of spaces moved by the feather
10 cm	1
20 cm	1½
30 cm	2
40 cm	2

What do you think the result will be if he drops the stone from 50 cm?

Finally, here are samples of anecdotal record cards:-

Notice space has been left for higher process skills, and social skills and special problems are noted here too.



Step 14

It is important to make your kit reasonably portable, and to have enough equipment to use with a whole class.

This may mean you have to exclude some activities.

STEP 15

When listing resources used, be specific. e.g. Schools Council - Science 5/13 "Like and Unlike" MacDonald Educational, London, 1973 Page 17.

Note the page number particularly. Later on you won't want to copy out ideas for activities - but if you have a record of exactly where to find them, that's nearly as good as having them copied.)

PREPARATION OF TEACHING KIT: CONTINUED

15.

Step 16

John and Shirley now have the task of communicating briefly what's in their kit to a casual observer. Their "overview" comprises a synopsis or rationale and a flow-chart showing the order in which activities are to be done, and how they relate to each other. This is an elaboration of the rough flowchart from Step 3.

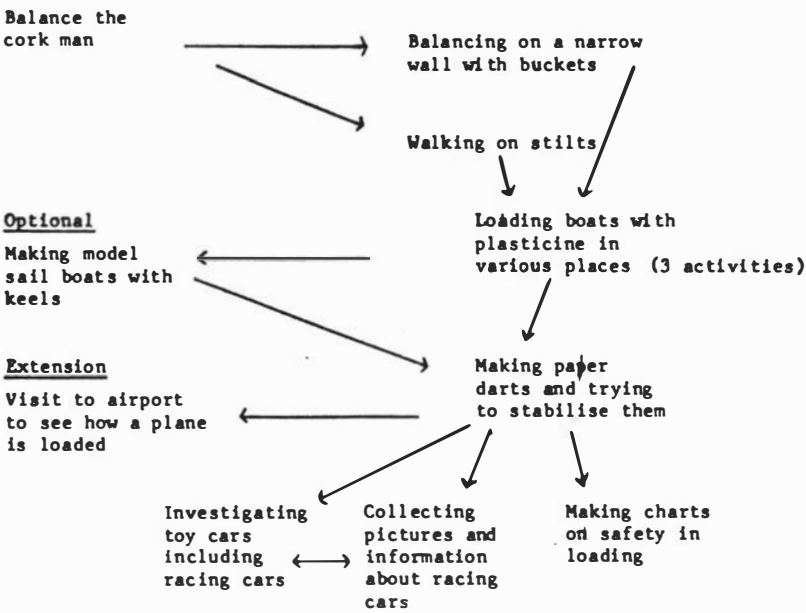
Here is their overview.

OVERVIEW

Synopsis

This teaching kit provides opportunities for children to investigate balance and stability of objects and vehicles. The process skills of observing, inferring and predicting are emphasised, as is the attitude of suspended judgement.

Flowchart



STEP 17

When you display your kit:

Have the Overview prominently displayed and have at least one activity that people looking over your kit can do.

PREPARATION OF TEACHING KIT: CONTINUED

Checklist For Assessment Of Your Teaching Kit

Assess your own kit by going through this checklist.

	Syndicate Assess	Tutor Assess
1. Does it have a title?		
Rationale or overview (and/or aims) which gives a potential user a summary of the contents and emphasis in the kit?		
2. Are the objectives written in behavioural (performance) form?		
(a) Are there process skill objectives? Check each process skill being practiced in your unit		
(Observing		
(Classifying		
(Measuring		
(Infering		
(Predicting		
Basic Skills		
Higher Skills		
(Hypothesising		
(Components of experimenting		
(b) Have you identified the <u>level</u> at which each process skill is being practiced?		
(c) Are there communication skills being practiced? Check each communication skill being practiced in your unit.		
Oral language vocabulary		
structures		
Written Language vocabulary		
structures		
Use of Symbols		
Sketches and observational drawings		
Diagrams		
Maps		
Data tabulation		
Graphing		
Use of units of measurement		
Organising evidence		
Presenting a report		
(d) Are there attitudes objectives listed?		
Is the style of the unit appropriate to their achievement?		

PREPARATION OF TEACHING KIT: CONTINUED

- (e) Are there higher level comprehension, application etc) understanding objectives?

--	--
3. Are there a range of activities?
- (a) A variety of activities?

--	--
- (b) Are the activities clearly linked to specific objectives?

--	--
- (c) Is the way each activity is to be organised clear?

--	--
- (d) Do the activities involve the children in first hand experiences and/or problem solving situations?

--	--
4. Are there evaluation instruments?

--	--
- (a) Is there provision for evaluation of the achievement of each objective for each child?

--	--
- (b) Are there ways of assessing process skill development?

--	--
- (c) Are there ways of evaluation attitude change?

--	--
- (d) Are there ways of assessing understanding?

--	--
- (e) Are there ways of assessing development of communication skills?

--	--
- (f) Are there suggestions for getting feedback during activities?

--	--
5. Are there suggestions for arranging situations that may motivate the children towards the activities?

--	--
- Is each strategy clear to another teacher?

--	--
6. Can another teacher pick it up and begin using it the next day?

--	--
- Is it comprehensible?
- coherent?

--	--
- readable?

--	--
- clearly set out and presented

--	--
- Does it have a set of equipment?

--	--
- list of equipment?

--	--
7. Is there a list of resources?

--	--
- Is there clear evidence of their use?

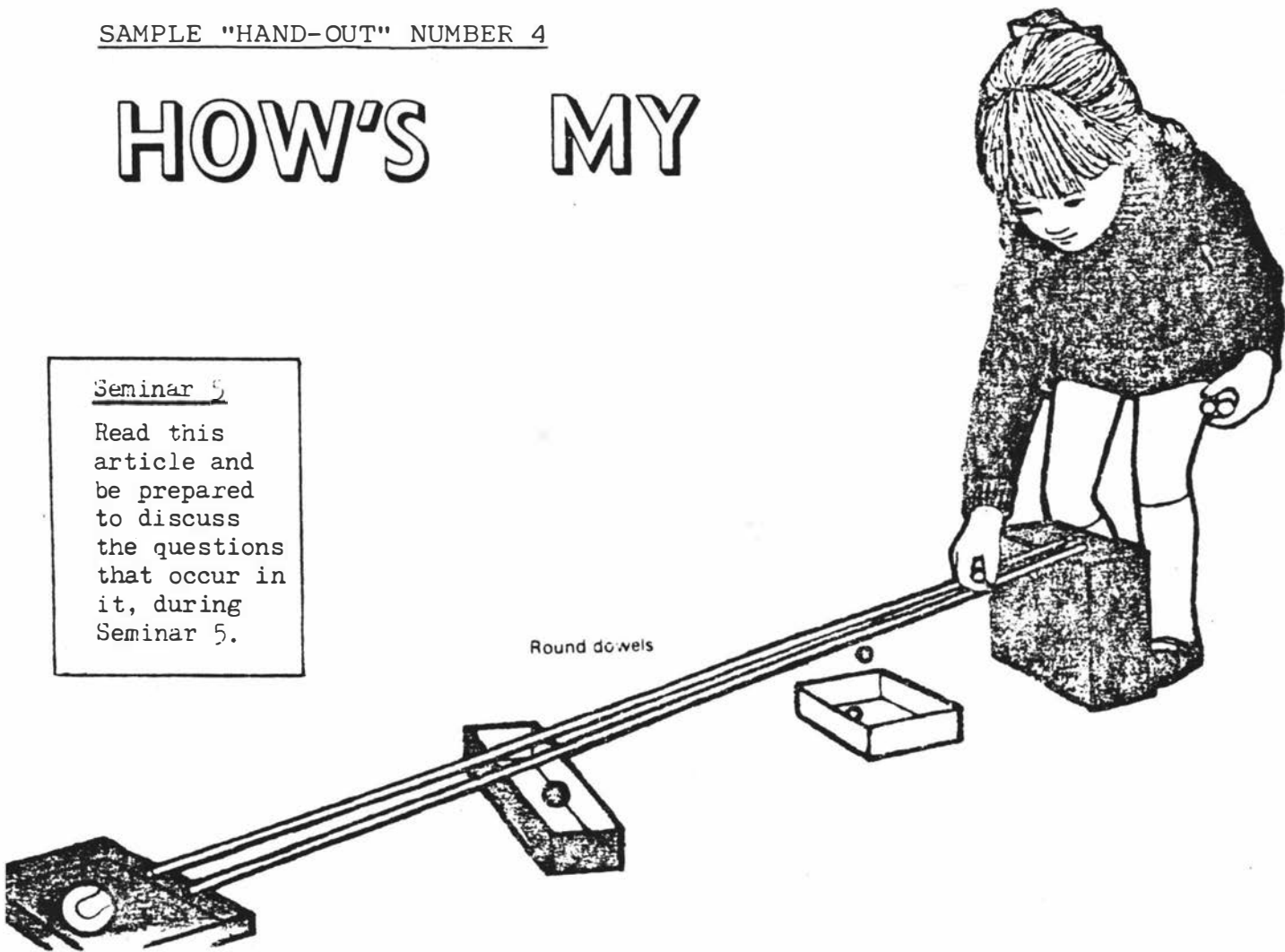
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8. Does it have any special qualities or aspects of particular merit that deserves extra credit?

SAMPLE "HAND-OUT" NUMBER 4

HOW'S MY

Seminar 5

Read this article and be prepared to discuss the questions that occur in it, during Seminar 5.



PROGRAMME GOING?

Introduction

There are two parts to this handout - an anecdote serves to introduce each.

FIRST PART

Miss Prize bursts into the staffroom after an interview with the visiting inspector.

"Good grief!" she sobs to Mr Greatshoulder,
 "He's asked me to evaluate my science programme!
 Where on earth do I start?"

Well! Where would you start? Can evaluation be divided into distinct components that can be tackled separately?

SECOND PART

Teacher to concerned parent (sounding, perhaps, a little condescending)

"Yes, the emphasis of our science programme is to develop children's process and communication skills these days."

Concerned parent:

"Oh I'm quite pleased to hear that. Last year my Alfred only got 4/20 in a science test, but when I looked at it, it seemed to involve knowing a whole lot of useless details about mice and snails. How is he getting on with his process skills? Have you got a mark out of 20?"

Well! How would you assess individual children's process skill development? and what about the other science syllabus objectives; attitudes, communication skills, and concepts?

PART 1 COMPONENTS of EVALUATION

It's useful to see evaluation as having three components.

Collecting information
Interpreting the information
Making decisions

<u>PROCESS</u>	<u>EXAMPLES</u>
Collecting information:	Exercises; tests, open ended problem situations; directed observation (e.g. using a checklist); casual observation; keeping anecdotal records; collecting and looking over work in exercise books; listening to children's verbal reports; asking questions of individuals; getting children to rate or report on their own, or each others work.
Interpreting the information:	Allocating comments, grades or rank order to children's work (with the implication that "higher is better"). Deciding what absence of ticks in a checklist might mean about the particular pupils achievement. Deciding John's verbal reporting skills are not as good as Shirley's.
Making decisions:	"The children didn't learn effectively when I used that uni I'll discard it next year." "I'll watch Mark very closely during our next science investigation - maybe I've overlooked him, and that's why he has no ticks in my checklist record." "I'll tell John's father he needs more encouragement to express himself clearly."

Exercise 1

See if you can identify each of these processes in the following anecdotes.

Write C, I, or M whenever you have to decide.

- (1) Mrs B gave her class a test. John scored 2/10.
- (2) Mrs B found that half the children had low marks and she told them they'd have to do the test again.
- (3) Mr M perused the ticks in the checklist he was using to note the children's process skill development. "That Mary," he muttered, shaking his head, "She can't hypothesise to save herself!"
- (4) The Principal looked over the science test marks. "Good grief!" he hissed, "These kids are way behind the other classes in science. Do something about it Miss B!"
- (5) Miss B gave her class (the ones whose science test marks aroused the Principal's ire) another rather simpler science test.
- (6) Mr J was assessing oral reading ability. He had listed his set of criteria, the last of which was "freedom of expression". Mary, when she was asked to read stumbled and hesitated, and sounded very stilted.

Later Mr J overheard her describing her new baby brother to a group of friends and none of the others seemed able to get a single word into the conversation at all.

- (7) Ms K sat down and thought about the events of the year, her classroom and those in charge, and the possibilities for the next year, then went to get a job application form.
- (8) Mr C shook his head as he looked through the work the children had handed in. "Only a small number have reached level 4 of inferring," he muttered to himself. "They're looking for evidence to justify conclusions, but they tend to have just one inference"
- (9) Mr C looked through his resource books until he found an activity on "Inferring from Moon Photographs" that encouraged alternative inferences. "I'll make it into a group competition he thought. "Which group of 'scientists' can list the most inferences that are consistent with the evidence?"



"EVALUATION" and "ASSESSMENT"- A NOTE

We'll distinguish between these terms in this course in the following way:

Evaluation is collecting information, interpreting it, it, and making decisions about what to change in an educational programme.

Assessment refers to part of this; collecting information, interpreting it, and making decisions about learning by the students (whether intended or unintended). Thus, part 2 of this handout "Collecting Information about Children's Achievement" is part of assessment as well as being part of the evaluative process.

Hey! That's all very well, but we've forgotten Miss Prize, and her problem; - how is she going to evaluate her science programme?

Let's pick up the conversation.....

Mr Greatshoulder told Miss Prize.

"The best way to start evaluating your science programme is by collecting information."

"Ah" she brightened, "I gave 'em a test last week. I'll use that."

"We-ell," (Mr Greatshoulder didn't want to upset her again) "You'll need a bit more information than that. You really need a range of strategies for assessing children's achievement of the various objectives of a science programme - but let's leave that until later."
(It's in Part 2 of this handout!)

"There's another aspect to this though; the evaluation is of your science programme; what the children learned is important, but not all the information you'll want. Here's the guide I use if I have to write up an evaluation."

Greatshoulder's Programme Evaluator

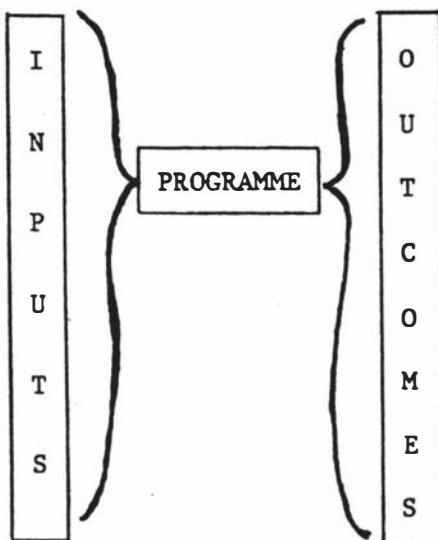
Was the planning OK?
(Objectives realistic?
Activities sufficiently
planned?
Evaluation strategies
realistic?
Useable?)

Were the teacher inputs
useful? Necessary?

Did the pupils
contribute?

Was the environment
suitable?

All materials OK?
Organisation OK?
Timing OK? Grouping?
Outside influences?



Did the students achieve
the planned objectives?
(Individually? Generally?)

Did they achieve any unplanned
learning?

How did they respond to the
activities?

How did the teacher feel
about the activities?

Was the learning environment
enhanced or restored after
the session?

Was there spin off to other
curricular or extra-curricular
activities?

Miss Prize was gleeful.

"Oh that's a framework I can use" -
but then sighed "But there's a lot
of information to collect to answer
all those questions"



STRATEGIES for COLLECTING INFORMATION

on CHILDRENS LEARNING AND DEVELOPMENT

Remember the concerned parent who asked the teacher how her Alfred was "getting on with his process skills".

The objectives of the science syllabus include process skills, communication skills, attitudes, and concepts. A teacher should therefore be assessing each child's development in each of these areas, and indeed be able to answer the "concerned parent's" question.

Of course you could write a book on this..... and a number of books on evaluation are available. One of the best for information on strategies for collecting information by means other than pencil and paper tests is:-

Gronlund, N.E., "Measurement and Evaluation in Teaching"
2nd Ed. Macmillan 1971.

Another source of ideas is your handout "How to Prepare a Science Teaching Kit", and finally, here is a useful exercise.....

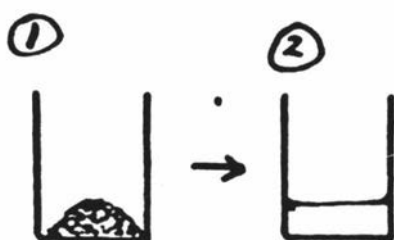
Exercise 2

A number of test questions, or problems, as well as examples of other strategies teachers have used for collecting information about their pupils are given below.

1. Each example is intended to collect information about the children's achievement of some objective. Decide what objective(s) in each case.
2. Can the example be used to assess achievement of the objective for each child?

No. 1

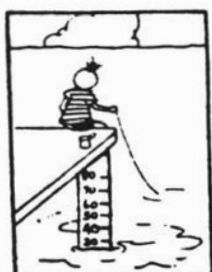
A technician in a factory laboratory tipped some powder from a sealed jar into a beaker, then noticed it was time to go home. When he returned next day there was about 2g of clear liquid in the beaker although the laboratory had been locked during his absence.



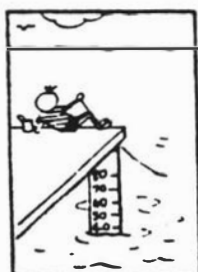
- (a) Can you suggest two possible explanations for the change?
- (b) Suggest a way of finding out which of your suggestions is more likely.

No. 2 from Vickery et al, "The Process Way to Science" (TPS)
Jacaranda Press, 1970.

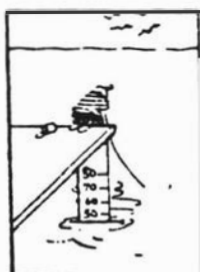
How Much have You Learnt?



8 a.m.



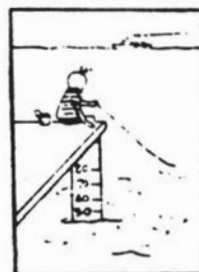
10 a.m.



12 noon



2 p.m.



4 p.m.

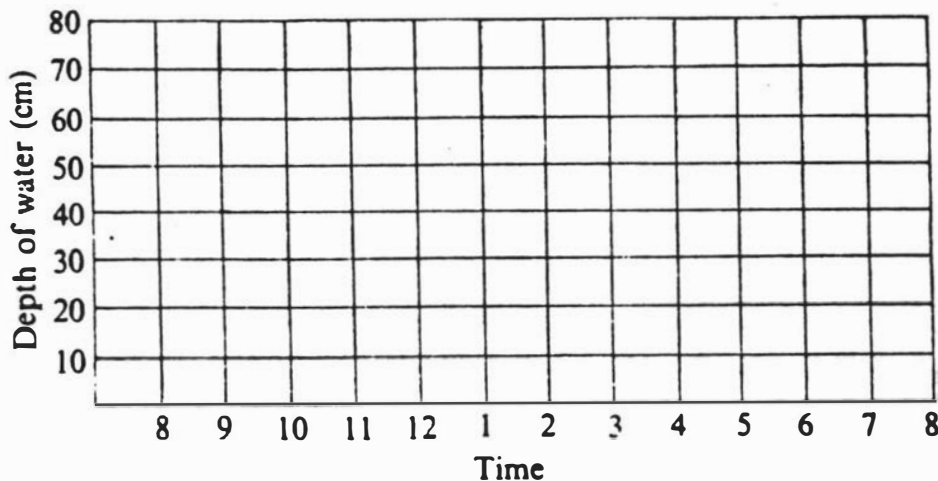


6 p.m.

TIME	DEPTH
8 a.m.	
10 a.m.	
12 noon	
2 p.m.	
4 p.m.	
6 p.m.	

★ Joey spent a day fishing from the jetty. The changing tide made the depth of water change. Study each picture and then write the different depths in the table.

★ Draw a line graph to show how the depth of water changed during the day.



★ Use the graph to predict the water level at each of these times:

9 a.m.; 11 a.m.; 3 p.m.; 7 p.m.

No. 3 from De Vito and Krockover, "Creative Sciencing". Teacher is to observe for these behaviours.

- using evidence to justify their conclusions;
- predicting the outcome of untried experiments;
- justifying their predictions in terms of past experience;
- changing their ideas in response to evidence or logical reasons;
- pointing out contradictions in reports by their classmates;
- investigating the effects of selected variables;
- interpreting observations in terms of the amount of energy transferred.

HOW'S MY PROGRAMME GOING?: CONTINUED

No. 4 from Gronlund, "Measurement and Evaluation in Teaching", 2nd Ed., p. 412.

Class <u>4th Grade</u>	Pupil <u>Bill Johnson</u>
Date <u>4/25/63</u>	Place <u>Classroom</u> Observer <u>M. G.</u>
INCIDENT	
<p>As class was about to start, Bill asked if he could read a poem to the class—one he had written himself—about "spring." He read the poem in a low voice, constantly looked down at the paper, moved his right foot back and forth, and pulled on his shirt collar. When he finished, Jack (in the back row) said "I couldn't hear it. Will you read it again—louder?" Bill said "no" and sat down.</p>	
INTERPRETATION	
<p>Bill enjoys writing stories and poems and they reflect considerable creative ability. However, he seems very shy and nervous in performing before a group. His refusal to read the poem again seemed to be due to his nervousness.</p>	

Figure 16.1. Anecdotal record form.

This last example illustrates a technique called "keeping anecdotal records". Gronlund provides the following advice for anyone planning to use anecdotal records ...

The problem in using anecdotal records is not so much what *can* be evaluated, but rather what *should* be evaluated, with this method. It is obvious that we cannot observe and report on all aspects of pupil behavior, no matter how useful such records might be. Thus, the time-consuming nature of the task requires that we be *selective* in our observations.

Deciding What Behaviors to Observe and Record

In general, our objectives and desired outcomes will guide us in determining what behaviors are most worth noting. In addition, we must also be alert to those unusual and exceptional incidents which contribute to a better understanding of each pupil's unique pattern of behavior. Within this general framework, there are several steps we can take to limit and control our observations so that a realistic system of recording can be developed. They are:

1. Confining our observations to those areas of behavior that cannot be evaluated by other means.
2. Limiting our observations of all pupils at any given time to just a few types of behavior.
3. Restricting the use of extensive observations of behavior to those few pupils who are most in need of special help.

No. 5 from Gronlund, p. 439. The pupils answer these questions about their peers. (Original source is Torrance "Guiding Creative Talent", Prentice-Hall, 1962.)

1. Who in your class comes up with the most ideas? (Fluency)

2. Who has the most original or unusual ideas? (Originality)

3. If the situation changed or if a solution to a problem wouldn't work, who in your class would be the first to find a new way of meeting the problem? (Flexibility)

4. Who in your class does the most inventing and developing of new ideas, gadgets, and such? (Inventiveness)

5. Who in your class is best at thinking of all the details involved in working out a new idea and thinking of all the consequences? (Elaboration)

Figure 17.2. Sample "Guess Who" items for evaluating aspects of

No. 6 This one is called a checklist. Your tutors are using one in this unit (based on the objectives.)

From Romey W.D.
"Inquiry Techniques
for Teaching
Science".
Prentice-Hall 1968.

Student's names	Able	Baker	Craft	Dodd	Jones	Smith	Zileh
comes prepared							
follows directions							
plans ahead							
modifies procedures and equipment appropriately							
cooperates with group							
handles equipment properly							
dexterous with equipment							
observes carefully							
works effectively, neatly							
records data systematically in notebook							
makes independent decisions							
assesses the meaning of data frequently							
relates to specific problems							
aware of assumptions and limitations							
makes use of references							
overall performance							
used "I think" or "I'm not sure"							
offered hypothesis							
changed opinion							
tested hypothesis							
saw relationship between facts							
admitted mistake and tried to correct it							
admitted he didn't know							
criticized and evaluated own work							
gave credit to others when deserved							
repeated work to validate results							



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