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DEVELOPMENT OF AN INSTRUMENT FOR THE ANALYSIS OF THE SOCIAL-EMOTIONAL TEACHER-PUPIL INTERACTION IN PHYSICAL EDUCATION *

INTRODUCTION

This paper gives an account of prelimenary construction of a system of interaction-analysis, developed to evaluate teaching behaviour in lessons of physical education. This analysis is part of an investigation into the effects of two extra lessons in physical education a week during a school-year upon the physical and mental development of 12- and 13-year old boys (Kemper et al. [3]). From a psychological point of view it is necessary to pay attention to the role of the teacher on the effects of physical education. For the teacher exerts influence on the pupils, there by modifying the experimental outcome in this investigation in a significant way.

Results of application of this interaction-analysis system were given from physical education lessons of four different teachers in four different first forms participating in the above mentioned investigation.

METHODS

Teaching-behaviour can be evaluated in different ways, dependent on the aims of the research. Our system of interaction-analysis is based on a method designed by Flanders [2]. His system consists of ten categories coding the verbal teacher-pupil interaction in the classroom. The large degree the act of teaching may be considered as a verbal interaction between teacher and pupils. It should be pointed out that Flanders confined his research to the "intellectual" schoolsubjects. For the analysis of teaching-behaviour in lessons of physical education this was the immediate cause to develop seventeen categories describing Flanders' categories concerning directive and non-directive teacher behaviour, as well another types of behaviour particularly relevant in the context of a lesson of physical education.

In our modidied Flanders-system the interaction in the lesson is differentiated into teacher and pupil behaviour. Teaching behaviour again is distinguished into non-directive and directive. For the major part it describes verbal behaviour related to a physical education context such as categories 3, 4, 8, 14 and 15 (Scheme 1).

The 17 categories of the modified Flanders' interaction analysis system

Teacher	Response	1 Acceptance of feelings; collectively
		2 Acceptance of feelings; individually
		3 Joning a game or performance
		4 Giving aid; non verbal
		5 Asking 'broad' questions
	Initiation	6 Asking 'narrow' questions
		7 Instructions, while pupils are inactive
		8 Showing a technique, without talking
		9 Instructions while pupils are active
		10 Giving directions
		11 Explicit stimulation
		12 Criticizing; collectively
		13 Criticizing; individually
Pupil		14 Action and performance
		15 Showing a technique and answerring 'narrow' questions
		16 Initiative and answerring 'broad' questions
		17 Silence or confusion

In recording the interaction in the classroom, observers usually tally with a constant time-interval (for instance 5 sec.), the displayed category of the teaching-behaviour. In the approach we have chosen, the behaviour is sampled in real time by means of a computer program. The procedure can be described as follows: Observers record the displayed behaviour by pressing a key on the keyboard of a teletype (Fig. 1). This teletype
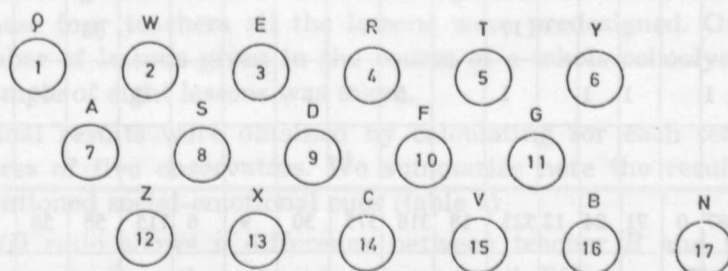

Fig. 1. Keyboard of the teletype with the numbers of the 17 categories indicated on keys

SCHEME 2

Matrix with steady state cells (diagonal, from upper left to right below) and transition cells: example of an analysis of an arbitrary lesson of physical education, with a duration of 40 minutes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	6									2				3				1
2		56		2					12	2				14	1			2
3																		3
4		1		42			7		18	1				2				4
5		1			86	1	2			2					1	1		5
6							7	1		2				1	0	1		6
7		1			2	1	468	6	18			1	1	22	3			7
8							6	11	1									8
9		8		14				1	228	2	4			60		1		9
10	1				4	1	19			321	2			21	1	5		10
11		2							3	1	15			8		1		11
12							1					7		1				12
13										1			4	1				13
14	3	17		5	2	2	1		51	15	9	1	1	601		7		14
15	1			7			17								33			15
16		1		1	1		1		5	7				3		39		16
17										1							6	17
Tot.	11	87	0	71	24	12	523	18	318	375	30	9	6	715	58	58	7	Tot
%	0.5	3.6	0,0	3.0	3.9	0.5	21.9	0.8	13.3	15.7	1.3	0.4	0.3	29.9	2.4	2.4	0.3	%

is connected on line with a Lab 8e Computer (Digital), while a video-
-taped lesson is presented off-line on a monitor. The observer hears by
way of a headphone and sees on the monitor what is said and done by
teacher and pupils. He presses a key only when the interaction in the
lesson changes. The computer is programmed to record every second the
category that was pressed until the observer presses another key. This
approach results in the "transition-matrix" which is appropriate for
further statistical analysis. In scheme 2 an example of an analysis of an
arbitrary lesson of physical education is given. This matrix has (17×17)
289 cells. The seventeen cells on the diagonal going from the upper left to
the bottom right are the "steady-state" cells recording behaviour that is
displayed for longer periods. The other cells are the so-called "transition"
cells recording the number of switches from one category to another. The
column totals can be expressed as a percentage of the teacher and pupil
behaviour.

Interpreting and decoding the matrix can be done by calculating
simple ratios; which ratio will be calculated is dependent on the specific
aims of the research.

In our investigation we used:

1. the I/D ratio; this ratio is a quotient of non-directive (I = indirect)
and directive (D) teaching behavior, calculated by the sum of the cate-
gories 1, 2, 3, 4 and 5, and divided by the sum of the categories 6 upto 13,

2. the acceptation/criticism ratio; this ratio is calculated by the sum
of categories 1 and 2, and divides by the sum of the categories 12 and 13,

3. the proportion of initiation of the pupil as assessed in category 16.

RESULTS

The four teachers of physical education (age between 28 and 32) giv-
ing lessons in the four first forms of a secondary school (St. Ignatius
College, Amsterdam) participated in this study with regard to aspects
of their teaching behaviour. To measure only differences in teaching-style
among these four teachers all the lessons were predesigned. Out of the
total number of lessons given in the course of a whole schoolyear (1971/
1972) a sample of eight lessons was taken.

The final results were obtained by calculating for each teacher the
mean scores of five observators. We summarize here the results of the
above mentioned social-emotional cues (table 1).

The I/D ratio shows a difference between teacher B and the other
teacher, among whom there is only a very small difference. The accepta-
tion/criticism ratio again shows a difference between B and his colegues.
Teacher A and D display similar behaviour, while teacher C is the only

TABLE 1

The 3 social-emotional cues: I/D-ratio, ratio acceptation $(1+2)$/criticism $(12+13)$, and pupil
initiation; rank order (r.o.) of the 4 teachers is based on the results of 8 lessons each

Social emotional cues	Teacher A		Teacher B		Teacher C		Teacher D	
	r.o.	results	r.o.	results	r.o.	results	r.o.	results
I/D-ratio	2	$\frac{996}{8658} = 0.12$	1	$\frac{1582}{8593} = 0.20$	4	$\frac{750}{9962} = 0.08$	3	$\frac{1041}{10904} = 0.10$
Ratio: acceptation criticism	2	$\frac{253}{96} = 2.6$	1	$\frac{400}{58} = 6.9$	4	$\frac{150}{158} = 0.95$	3	$\frac{222}{93} = 2.4$
Pupil initiation	2	$371 = 2.3\%$	4	$115 = 0.7\%$	1	$472 = 2.7\%$	3	$246 = 1.3\%$

one whose criticism-score exceeds his acceptation-score. The difference
between B and C becomes therefore rather great.

The percentage of pupil-initiation shows once more differences between
B and C, but this time in the "opposite" direction: teacher C permits
more pupil initiation in his class than teacher B.

DISCUSSION

On all relevant social-emotional categorie teachers B and C are op-
posite of each other while the teachers A and D display more or less the
same behaviour. It is important to emphasize that B and C were connected
with the two first forms of the experimental group. How far these dif-
ferences and interfering effects on the effects of the two extra lessons
a week could not be assessed. For in the analysis of covariance only pupil
characteristics as dependent variables could be taken up.

Further attention have to be paid for the fact that differences in tea-
ching-style took up only 20% of the total teacher-pupil interaction of the
lessons; the other 80% is real teaching-behaviour and as far as that grea-
test part concerned the behaviour is the same between the four teachers.

A review of the litterature shows differences in teacher-variables such
as non-directive versus directive, as being related to pupil-variables. Flan-
ders summarizes his own research by stating that non-directive teaching
behaviour has a positive effect upon the attitudes of the pupils towards
the lesson and the teacher and an increase in pupil achievement. Veen [4]
found in groups of 12- and 13-year old boys that with decreasing power
distance (as a synonym for non-directive behaviour) between trainer and
trainees in hockey, the achievements of the trainees increased. Finer [1]
however found in 10- and 11-year old children no difference in achie-
vement on basic motor abilities when directive and non-directive teaching
behaviour were compared.

In table 2 the results are summarized of the reproducebility between two observations of the same lesson from four observers with different intervals. The coefficients (calculated with Scott's π) are high and are

TABLE 2

Agreement between two observations of one judge, calculated with Scott's π

Observa-tor	Interval of 3 months		Interval of 2 months		Interval of 1 month		Interval of 3 weeks	
	lesson 4	teacher A	lesson 5	teacher D	lesson 7	teacher B	lesson 8	teacher D
B2	—		.74		.74		.91	
B3	.81		.77		.91		.67	
B4	.85		.75		.83		.90	

independent of the interval. Therefore this system of interaction analysis can be described as "low-inference", i.e. the categories are related to specific and objectively observable types of teaching behaviour.

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VISUELLE INFORMATION ALS LERNHILFE AM BEISPIEL
VON MINIFILMEN

In die am 7.8.1973 in Kraft getretenen „Richtlinien und Lehrpläne für die Grundschule in Nordrhein-Westfalen" ist den audiovisuellen Informationen ein besonderer Abschnitt gewidmet. Damit werden dem Lernprozess mit Hilfe von Medien besondere Beachtung geschenkt und die positiven Ergebnisse in der Entwicklung der Unterrichtstechnologie auch für die Grundschule nutzbar gemacht.