M. E. Kneer, y otros: Desarrollo de un modelo ahorrativo y al mismo tiempo de aprendizaje fácil para clases individuales en el campo de la Enseñanza del Deporte.

Finalidad de esta investigación era de desarrollar y examinar un modelo de enseñanza que por una parte es ahorrativa por otra parte garantiza que los alumnos van aprendiendo dentro el campo psiquomotorico, afectivo y cognoscible. En total era planificado aumentar el numero de alumnos dentro de las clases, bajar los gastos y posibilitar flexibilidad y al mismo tiempo satisfacer los necesidades de aprendizaje por parte de los alumnos.

Esto mismo debería garantizar que se enseñen en formas variadas y que se disponga de una variedad de métodos del trabajo práctico y de valorización.

L. M. Ridini: Recomendaciones para un uso efectivo de salos pequeñas con la participación de grupos numerosos.

El tema mencionado dentro de este estudio representa unos de los mayores problemas para una enseñanza efectiva de Educación Física. El autor propone que el profesor este dotado o se desarrolle las sequientes habilidades: dominación de numerosos alumnos en campos limitados; coordinación de alumnos y profesores, selección de ejercicios que garantizan una participación alta de alumnos en un espacio limitado. Todos esto sin perder de la vista la finalidad: aumentar las interacciones y la conciencia de responsabilidad por parte del alumno, examinar periódicamente los progresos.
El autor explica estos cinco aspectos parcialmente para indicar posibilidades como se puede resolver este problema fundamental para el trabajo diario en la enseñanza de la Educación Física.

Development and application of a physical education interaction analysis system

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Several observation scales of teacher behavior have been developed for use in traditional classrooms. Some of the better known instruments are: the Flanders Interaction Analysis Categories (FIAC) (Flanders, 1970), the Verbal Interaction Category System (VICS) of Amidon and Hunter (1967), Hough's (1967) Observational System for Instructional Analysis, and the Observation Schedule and Record (OScAR) of Medley and Mitzel (1958, 1963). The uses of these observation scales, however, were confined to studies of teacher behavior in the so-called cognitive schoolsubjects. Studies within this area, that relate classroom climates to a multitude of pupil traits and behaviors have been appearing in the literature for many years. This extensive body of information suggests that pupils under the direction of democratic, student-centered or nondirective teachers display better adjustment, more positive attitudes toward the teacher and learning, better work habits, more self-initiated work activity and higher achievement than do pupils under the direction of autocratic, teacher-centered or directive teachers (Amidon & Flanders, 1967; Duffey & Martin, 1973; Flanders, 1970; Lewin, Lippitt & White, 1967; Medley & Mitzel, 1959).
As for research within the area of physical education and sports, Finer (1971) found no differences in achievement when directive and nondirective teaching styles were compared. The studies of Mariani (1970) and Veen (1969), however, indicated differences in achievement when directive and nondirective teaching styles were compared.

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In a multidisciplinary investigation into the effects of two extra lessons a week of physical education during a schoolyear upon the physical and mental development of 12- and 13-year old boys (Kemper, Ras, Snel, Splinter, Tavecchio and Verschuur, 1974), the lessons were given by four teachers. Thus, it became apparent that evaluations of their teaching styles had to be made. The teacher effect as a potential interfering variable between the application of the treatment and changes in the dependent variables, could greatly increase the interpretability of the results of the investigation. Based on the FIAC of Flanders (1970), a system of interaction analysis was designed to observe and assess teacher behavior in physical education, with the emphasis on the measurement of nondirective and directive aspects of teacher behavior.

The instrument

The emphasis in the Physical Education Interaction Analysis System (PEIAS), like in the FIAC, is on the verbal behavior of the teacher, considering the act of teaching to a large extent as a verbal interaction between teacher and pupils. In modifying the FIAC to make it fit in a physical education context, it seemed necessary to extend the 10 verbal categories of the FIAC to 17 categories in the PEIAS, including certain nonverbal behavioral events, characteristic for physical education (see Table 1).

Table 1. Categories provided in the PEIAS.

Teacher behavior:

1. Acceptance of feelings, ideas and actions of groups of pupils; praise and encouragement; collectively.

Nondirective influence (response)

2. Like category 1, individually.
3. Taking part in game or a performance; without verbal behavior of the teacher.
4. Giving assistance to the pupils; except verbal behavior of the teacher.
5. Asking "broad" questions.

~~Teacher behavior~~ Directive influence (initiation)

6. Asking "narrow" questions.
7. Lecturing or instructing, giving specific directions; (the majority of the) pupils are inactive.
8. Demonstration of a performance by the teacher; without verbal behavior of the teacher.

~~*Directive influence (initiation)*~~

9. Like category 7; (the majority of the) pupils are in action.
10. Giving general directions, commands and orders to which a pupil is expected to comply.
11. Explicit stimulation; no immediate reference to the content of the lesson.
12. Criticizing and neglecting of feelings, ideas and actions of groups of pupils; collectively.
13. Like category 12; individually.

Pupil behavior:

14. Action and performance of the pupils; without verbal behavior of the teacher.

~~*Response*~~

15. Demonstration of a performance by a pupil, answers to "narrow" questions; without verbal behavior of the teacher.

RESPONSE

~~*Pupil behavior*~~

16. Initiative of pupils in all possible ways; answers to "broad" questions.

INITIATION

~~*Initiation*~~

17. Residual category; to be used in silence and confusion.

General review of the PEIAS and discussion of differences with the FIAC

Teacher behavior: nondirective (response)

category 1: Acceptance of feelings, ideas and actions of groups of pupils; praise and encouragement; collectively, to the group as a whole or more than one pupil at a time. Examples: a. "You all did a very good job"; b. "I understand that everybody is very tired now, but . . ." As for praise and encouragement, they may consist of single words, e. g.: "Excellent" or "Good", etc.

category 2: Like 1; individually. Examples: a. "Well done Bill"; b. "Good for you John, you remembered the exercise we did last week, didn't you".

The FIAC uses three categories to describe accepting behavior of the teacher, the PEIAS only

one. The distinction made between collectively and individually in the categories 1 and 2 needs an explanation: generally, lessons in physical education are performed rather collectively, i. e. in large gymnasiums with impersonal remarks in an "objective" atmosphere. Especially in such an atmosphere, the individual approach of the teacher is indicative of the degree of attentiveness of the teacher for the pupil(s).

category 3: Taking part in a game or a performance; without verbal behavior of the teacher.

category 4: Giving assistance to the pupils *except verbally*. Example: The teacher assists at leaping the buck.
The categories 3 and 4 are introduced as nondirective instances of teacher behavior, because they are specific to physical education and because they are examples of situations which reduce the social-emotional distance between teacher and pupil.

category 5: Asking "broad" questions. Example: "Who has another idea he would like to add?".
Category 5 is considered as an instance of nondirective teacher behavior, because there is an opportunity here for pupil initiative, as opposed to the next category, where this opportunity is virtually nonexistent. The FIAC does not make the distinction, although a difference between broad and narrow is mentioned.

Teacher behavior: directive (initiation)

category 6: Asking "narrow" questions. Example: "How many times did you leap the buck?".

category 7: Lecturing and instructing, giving specific directions; (the majority of) pupils are inactive and listening. Examples: a. "Presently we are going to work on the parallel bars and it is important to . . ."; b. "In playing football you never may . . .".

category 8: Demonstration of a performance by the teacher; no verbal behavior.

category 9: Like category 7; (the majority of) pupils are in action. Example: "Now try to run faster".
The distinction between category 7 and category 9 is an appropriate one, because of the importance as such of activity in physical education.

category 10: Giving general directions; commands and orders to which a pupil is expected to comply. This category is copied from the FIAC. It deals with directions that are not directly related to the instructive part of the lesson. Examples: a. "Put the benches to the horizontal bars"; b. "When I'm talking please listen and be silent".

category 11: Explicit stimulation; no immediate reference to the content of the lesson. This category is introduced because it appeared from the training of the observers that certain stimulating remarks of the teacher could not be classified under other categories. These remarks are mostly referring to some external criterion. Example: "Come on boys, lets keep it up, we're not in an old people's home here!".

category 12: Criticizing and neglecting of feelings, ideas and actions of pupils; collectively, to the group as a whole or more than one pupil at a time. Examples: a. "One of the troubles is that you don't listen to my instructions"; b. "I had expected a little bit more sportsmanship from you".

category 13: Like category 12; individually. Examples: a. "Don't keep harping on that Richard"; b. "Once again John, keep your mouth shut!".
The distinction between the categories 12 and 13 was made on the same grounds as the one made between the categories 1 and 2. In this case too, there exists a psychological difference between a critical remark addressed to the group as a whole or addressed to an individual pupil.

Pupil behavior: response

category 14: Action and performance of the pupils; without verbal behavior of the teacher. It should be evident that in a physical education context action and performance of the pupils are behavioral events that are important by themselves. The introduction of this category can be considered as an important departure from the FIAC, because it codes a significant behavioral event that is strictly nonverbal. In the FIAC this behavior should be classified under silence or confusion.

category 15: Demonstration of a performance by a pupil; answers to "narrow" questions; without verbal interference of the teacher. In both cases the pupil responds to teacher-initiated behavior.

Pupil behavior: initiation

category 16: Initiative of the pupils in all possible ways; answers to "broad" questions. Examples: a. "Sir, we've done some very strenuous exercises up till now, I think we should

play football", b. "Sir, how about playing a match against the 10th grade next week?". This category is meant to classify all behavioral events, initiated by the pupils, that go beyond or depart from the existing "narrow" teacher-pupil interaction in the classroom.

Silence/Confusion

category 17: Residual category; to be used in silence or confusion, in which communication cannot be understood or coded by the observer. In general, the categories bordering on the dividing lines in Table 1 can be considered "transitional", e. g. the categories 5 and 6. Whenever is added "without verbal behavior of the teacher", this means that the verbal interference of the teacher should be classified under the appropriate category, because of the prominence of verbal interaction in the PEIAS. The FIAC and the PEIAS share several important characteristics:

1. Both systems are meant to be totally inclusive and mutually exclusive, as for the behavioral events that are coded by the categories.

2. Both systems are characterized by *low-inference* i. e. the categories code behavioral events that are specific, well-defined and directly observable. Some degree of interpretation is inevitable, of course, but both systems attempt to keep the amount of interpretation to a minimum by abstracting *all* the behavior of teacher and pupils into categories.

Procedure of observation

In recording the interaction in the classroom, observers usually tally the displayed behavior with a constant time interval, e. g. three seconds in the FIAC. The approach used in the present study applied a specially developed computer program for sampling videotaped behavior in real time. Observers coded the displayed behavior by pressing a key on the keyboard of a teletype, connected on-line with a LAB 8/e computer. The numbers of the categories were indicated on the keys of the teletype. A key was pressed only when the interaction changed. The computer was programmed to record *every second* the key that was "on", until the observer pressed another key. The choice of this 1-second interval was based upon the rationale that in this way the coding of very short statements or behavioral events would be possible, so that not only the time, but also the frequency of behavioral events could be kept up with accuracy.

Data analysis

Whenever a videotaped lesson has been coded in the above described way, a computer program samples the behavior in real time and transforms it into a transition matrix, which is suitable for statistical analysis. The matrix has 289 cells (17×17). The 17 diagonal cells are the *steady-state cells*, coding the behavior (in seconds) that was displayed for longer periods of time in one category. The other cells are the transition-cells, lying on both sides of the diagonal, coding the number of switches from one category to another, a switch being counted as one second. The column totals can be expressed as a percentage of the teacher and pupil behavior occurring during the whole of the lesson.

Interpreting and decoding the matrix can be done by calculating simple ratios. Which ratios are used, of course, depends on the specific aims of the research. Because of the importance we attach to social-emotional aspects of teaching behavior (nondirectiveness), the following measures were chosen: (see Table 2).

a. The N/D-ratio; the ratio is a quotient of nondirective (N) and directive (D) teaching behavior, calculated by the sum of the categories 1 through 5 and divided by the sum of the categories 6 through 13.

b. The acceptance/criticism-ratio; this ratio is calculated by the sum of the categories 1 and 2 divided by the sum of the categories 12 and 13. In calculating this ratio we did not use the column totals of these categories, since they code mainly behavioral events consisting of rather short statements made by the teacher. Instead, we counted the *frequency of occurrence* of the behavior, by subtracting the number of seconds in the steady-state cells from the column totals of the categories.

c. The percentage of pupil initiative, as assessed in category 16. This category expresses the permissiveness of a teacher of spontaneous pupil behavior.

Data collection

Four male teachers (age between 28 and 32) took part in a multidisciplinary investigation into the effects of two extra lessons of physical education a week during a schoolyear (ca. 40 weeks) upon the physical and mental development of 12- and 13-year old boys (Kemper et al., 1974). Each of them taught one of the four first forms of a secondary school in Amsterdam. Two forms constituted the experimental group ($n = 33$),

with teachers B and C, the other two forms constituted the control group ($n = 37$), with teachers A and D. In a pretest-posttest control group design, the experimental group received five lessons of physical education a week, the control group the normal three lessons. To assess the possible influence of the teacher as an interfering variable, a sample of eight lessons was taken out of the total number of lessons given in the course of the schoolyear '71/'72 and recorded on videotape. The lessons chosen contained several topics in the physical education curriculum and were spread over the schoolyear. To measure differences in teaching style only, all of the lessons were predesigned as far as the subject-matter of teaching was concerned and given by the four teachers in the same working order. As to the style of teaching no instructions were given.

Training of observers

The original PEIAS was developed by having observers write down a detailed record of what teachers were doing in the physical education classes. The training program involved exercises in categorizing written examples of teacher behavior in physical education, discussion of the operational definitions of the categories, practice coding of video-taped lessons on the keyboard of the teletype and discussion of coding problems with the trainer. Preliminary reliability studies indicated that 17 categories permitted the best description of events, that would be expected to occur in physical education classes. In this way, the categories would be clearly defined, distinct and reliable. The five observers who participated in the study came from the area of physical education: three of them were graduates of the Amsterdam Academy of Physical Education, the other two were third- and fourth-grade students of the same Academy. On account of technical and organizational reasons, it was not feasible to train the observers up to the point where a high degree of interobserver agreement would exist, as, of course, should be done. However, because of the objective to compare the four teachers concerning aspects of their teaching styles, we decided to use the five observers, all of them coding each of the video-taped lessons.

Results

Interteacher differences

As can be seen in Table 2, the N/D-ratio showed a rather large difference between teacher B (.20) and the other teachers A, C and D (.12, .08 and .10, respectively), among whom there existed smaller differences. The acceptance/criticism-ratio again pointed to differences between teacher B (6.9) and his colleagues. Teacher A and D displayed about the same behavior (2.6 and 2.4, respectively), whereas teacher C (.95) was the only whose criticism score exceeded his acceptance score. This made the difference between B and C rather large. The percentage of pupil initiative, as assessed in category 16, once more yielded the largest difference between teacher B (.07%) and teacher C (2.7%). In comparing the four teachers in a broader sense, it was rather conspicuous to note the "lack" of asking questions. Table 3 shows that teacher B asked the fewest questions (0.6%), teacher D the most (2.1%). As for the instructing categories (7 and 9), there existed a difference between the teachers A and D and the teachers B and C. Teacher A and D gave more instruction while the pupils were inactive than while they were active, whereas the reverse held for teacher B and C.

Interobserver reliability of the PEIAS

The objectivity of the instrument, operationalized as the degree of interobserver reliability, was assessed with the help of the Kendall coefficient of concordance W (Siegel, 1956). This coefficient is a measure of the relation among several rankings of N objects or individuals. The following method was employed: per category and per observer the total number of observations, summed over the sample of eight lessons (identical for each teacher), was ranked over four teachers. As can be seen in the last column of Table 3, the five observers showed high agreement concerning their rankings of the four teachers on most of the categories. Three categories yielded a value of W significant at the .05 level and 12 a value of W significant at the .01 level. Only two categories (3 and 11) yielded a nonsignificant value of W. Thus, in using Kendall's measure it could be shown that the interobserver agreement of the PEIAS was rather high. A high or significant value of W does not mean that the rankings observed are correct! In this special case, the ranking of the teachers, based on independent observations of five observers, served more or less as an "objective" one, because a relevant external criterion does not exist.

Table 2. Means and Standard Deviations of the three social-emotional measure calculated over eight lessons.

Measure		Teacher A	B	C	D
Nondirective/directive ratio	*M*	.12	.20	.08	.10
	SD	.04	.08	.05	.04
Acceptance/criticism ratio	*M*	2.60	6.90	.95	2.40
	SD	1.15	3.61	.64	1.18
Pupil initiative*	*M*	2.3%	.7%	2.7%	1.3%
	SD	1.22	.27	1.15	.54

* Expressed as a percentage of the sum total of teacher and pupil behavior.

Discussion

The PEIAS contains many categories. It is not unusual in research to create new variables by adding together several categories, sometimes even without determining whether the categories are actually correlated. Factor-analytic procedures, however, are the most common techniques for discovering the interrelationships among variables and they have been used in a number of studies of classroom behavior to derive a smaller set of variables from the original categories (Medley & Mitzel, 1958; May & Devault, 1967; Emmer & Peck, note 1). In this way, it is possible to determine empirically the dimensions underlying the observation system. Moreover, users of the system will have a better understanding of the variables which the observation system actually measures. However, it should be kept in mind that in these studies large numbers of observations were made of many teachers. In the present study the emphasis was on the *development* of an observation system and its application in physical education. The combination of categories on an empirical basis, i. e. an attempt to determine the dimensionality of the system, remains an important issue for

Table 3. Percentage per category per teacher, calculated over eight lessons and the interobserver agreement W.

Category	Teacher A	B	C	D	W
1. Acceptance, collectively	.7	1.7	.5	.9	1.00**
2. Acceptance, individually	4.1	6.3	2.4	2.8	.86**
3. Taking part in a game	.1	.0	.1	.2	.30
4. Giving assistance	.7	1.0	1.0	.8	.52*
5. Broad questions	.6	.2	.3	.8	.61*
6. Narrow questions	.9	.4	.8	1.3	.90**
7. Lecturing, inactive	20.9	15.0	14.9	19.9	.79**
8. Demonstration by teacher	1.6	1.2	1.6	1.0	.58*
9. Lecturing, active	12.5	20.3	19.4	16.1	.94**
10. General directions	14.2	11.2	14.3	15.8	.86**
11. Explicit stimulation	1.0	.7	1.2	1.1	.26
12. Criticizing, collectively	.9	.3	1.5	.7	.85**
13. Criticizing individually	1.4	.7	2.8	1.4	.90**
14. Action and performance	33.6	37.5	32.4	31.3	.75**
15. Demonstration by pupil	.9	1.6	1.3	2.3	1.00**
16. Pupil initiative	2.3	.7	2.7	1.3	.90**
17. Silence and confusion	3.9	1.5	2.9	2.4	.78**
Total	100.3%	100.3%	100.1%	100.1%	

* $p < .05$; ** $p < .01$

future research, since in our study only four teachers were involved.

In discussing the results obtained with these four teachers, Table 3 reveals that directive categories like instructing (7 and 9), giving directions (10) and action and performance (14) included about 80 percent of the behavior displayed, a finding which can almost be considered as "normal" (cf. Dunkin & Biddle, 1974; Flanders, 1970; Nygaard, note 2). The remaining 20 percent we considered very important, since within the 80 percent the behaviors of the four teachers were almost the same. With regard to nondirective statements of the four teachers, the teachers B and C proved to be each other's opposites on the three social-emotional measures (see Table 2). It is important to note that they were connected with the two forms that made up the experimental group used in the main investigation. In view of the exploratory character of these results, extensive statistical testing of the interteacher differences was omitted. Performing Wilcoxon's two-sample test on the data of Table 2 revealed, however, that the teachers B and C differed significantly on these three measures ($p < .01$). How far the discrepancy between the two "experimental" teachers had an interfering influence on the effects of the two extra lessons of physical education remains a matter of speculation: (a) First, since the PEIAS is not yet standardized or validated, it was not possible to indicate the absolute position of each teacher on the continuum directive-nondirective. (b) Consequently, it was not possible to say anything definitive about the meaning of the interteacher differences. (c) Finally it is not known which ratio between directive and nondirective teacher behavior is most conducive to learning in physical education. Nevertheless, an attempt was made to relate teacher behavior to the psychological and physical growth of the pupils. On the whole, this exploratory analysis showed that the discrepancy between the teachers B and C possibly masked the effects of the extra lessons on a number of pupil variables (Kemper et al., 1974).

In the PEIAS, both teacher and pupil behavior are coded in verbal and nonverbal categories. In this way, overlap of teacher and pupil behavior sometimes is inevitable. In the system the problem was evaded by considering teacher behavior as the most prominent. Thus, the categories in which pupil behavior is coded do not always reflect the real situation as it is in the lesson of physical education. There exist other solutions to this problem, e. g. either coding teacher and pupil behavior separately by two observers, or by one observer, coding teacher and pupil behavior successively (Medly & Mitzel, 1963).

The use of observation in educational research, intended to measure process variables intervening between the application of a treatment and outcome variables, is rapidly increasing. In contrast, it is rather disappointing that so little research has been done in an area which is so important for human health as physical education and sports. We hope that this state of affairs will change in the near future, so that the PEIAS, or similar systems, can be applied in research and in training and counseling coming teachers of physical education.

Footnotes — Anmerkungen

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Entwicklung und Anwendung eines Systems zur Interaktionsanalyse in der Leibeserziehung

Louis W. C. Tavecchio, Paul G. Splinter, Han C. G. Kemper, Koos G. A. Ras, Jan Snel, Robbert Verschuur

Verschiedene Beobachtungsverfahren für Lehrerverhalten sind für den Gebrauch im Klassenzimmer entwickelt worden. Einige der bekannteren sind folgende: „Flanders' Interaction Analysis Categories (FIAC)" (Flanders 1970), „Verbal Interaction Category System (VICS)" von Amidon und Hunter (1967), Hough's (1967) „Observational System for Instructional Analysis" und „Observation Schedule and Record (OSCAR)" von Medley und Mitzel (1958, 1963). Der Gebrauch dieser Beobachtungsskalen bezieht sich allerdings auf die Untersuchung des Lehrerverhaltens in sog. „geistigen" Schulfächern. Untersuchungen dieser Art, die Verhalten im Klassenzimmer mit einer Vielzahl von Verhaltensweisen des Schülers in Beziehung setzen, sind in der Literatur über viele Jahre hin zu verfolgen. Nach all diesen Informationen kann man feststellen, daß Schüler unter einem demokratischen, schülerorientierten und sich nicht direktiv verhaltenden Lehrer eine bessere Anpassung zeigen, positivere Einstellungen gegenüber dem Lehrer und dem Lernen entwickeln, bessere Arbeitsgewohnheiten besitzen sowie mehr Selbstinitiative im Hinblick auf Arbeit und eine höhere Leistung erreichen als Schüler unter Leitung eines autokratischen, lehrerzentrierten oder direktiven Lehrers (Amidon und Flanders, 1967; Duffey und Martin, 1973; Flanders, 1970; Lewin, Lippitt und White, 1967; Medley and Mitzel, 1959).

Im Hinblick auf Forschung im Rahmen der Leibeserziehung und des Sports hat Finer (1971) keine Leistungsunterschiede in bezug auf direktive und nicht-direktive Lehrstile gefunden. Die Untersuchungen von Mariani (1970) und Veen (1969) zeigten jedoch Leistungsunterschiede bei einem Vergleich von direktiven und nicht-direktiven Unterrichtsstilen.

In einem interdisziplinären Untersuchungsprojekt sind die Wirkungen von zwei zusätzlichen Sportstunden pro Woche während eines Schuljahres auf die körperliche und geistige Entwicklung von 12- und 13jährigen Jungen untersucht worden, wobei die Unterrichtsstunden von vier Lehrern erteilt worden sind (Kemper, Ras, Snel, Splinter, Tavecchio und Verschuur, 1974). Somit konnten ihre Unterrichtsstile ausgewertet werden. Der Einfluß des Lehrers als eine mögliche intervenierende Variable zwischen der Anwendung der speziellen Behandlung und den entsprechenden Veränderungen im Hinblick auf die abhängigen Variablen konnte die Interpretationsfähigkeit