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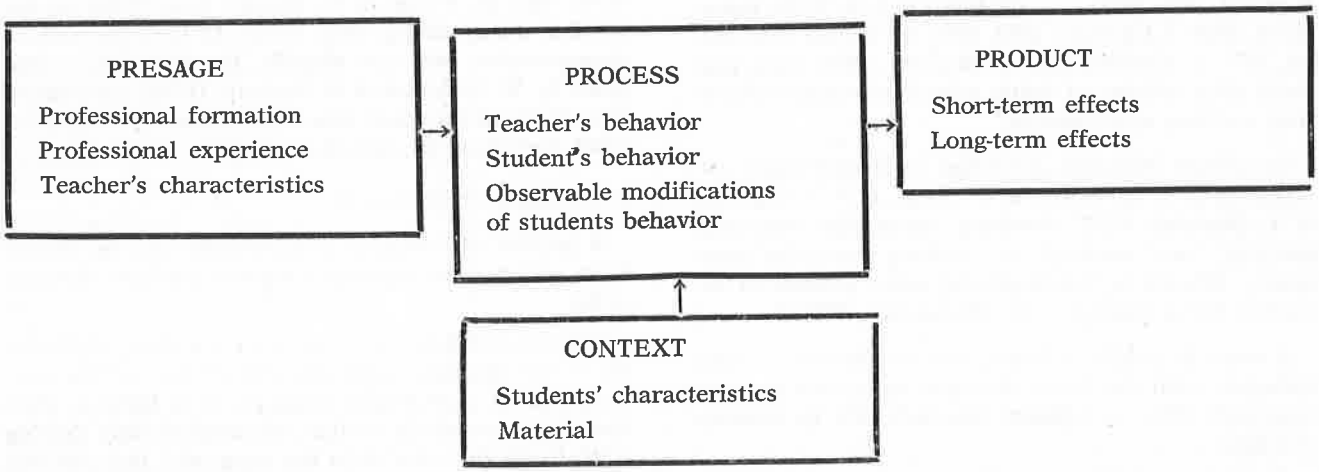
MAURICE PIERON
University of Liège

EFFECTIVENESS OF TEACHING PHYSICAL EDUCATION

A paradigm designed by Mitzel aids understanding of the teaching process and enables us to summarize research knowledge. Many Theorists of education have modified, refined and used this paradigm. The model associates presage, context, process and product variables. These are well defined in educational textbooks (G. Dussault & coll., 1973; M. Dunkin & B. Biddle, 1974).

Presage variables concern the characteristics of the teacher: formative and training experiences, personality, properties. Context variables concern the teaching environment: material and equipment and formative experiences of the pupils. Process variables concern the activities, what happens in the classroom, in the sports hall, on the sports field. Product variables concern the outcomes of teaching.

Studies based on presage or product variables provide a very limited amount of knowledge usable in teaching practice. The research focus had to be shifted to process, to what was happening in the classroom, to better understand teaching. Some years ago, this research trend appeared in physical education.



MODEL OF RESEARCH OF EDUCATION PROCESS (Modified according to H. MITZEL, 1960; N. L. GAGE, 1963; G. DUSSAULT et assoc., 1973; M. J. DUNKIN and B. J. BIDDLE, 1974)

Teaching analysis attempts to describe accurately and objectively the reality of a class. It is based on observation of teachers and students behaviors through systems of categories.

After validating the observation system and training the observer to gather reliable data, these schedules are applied in live observation or in observation of videotapes. When used for research purposes some multidimensional systems need a written transcript of teacher and student talk.

Observation systems found application as controllers of teaching strategies, as feedback in teacher training, as research instruments identifying various kinds of teacher behaviors or interaction patterns.

As pointed out by Anderson (1971) the principal concern of descriptive records of events in actual classrooms and to analyze these records in a way that enables a better understanding of the events«.

If limited to the sole descriptive aspect, teaching analysis would soon become a sterile academic exercise unable to fulfil the hopes it raises: to improve teaching.

In this paper, we shall seek out several variables reflecting efficient teaching in studies dealing with the climate of the class, functions and meanings of teacher interventions, and students behaviors. In evaluating teaching, data collected in the »Beginning Teacher Evaluation Study« and in the »Research on Teaching Effectiveness« trends prove to be of interest as an inspiration source for physical education.

OBSERVATION OF TEACHERS BEHAVIORS

1. Climate of the class

The origins of Flanders Observation Interaction Sy-

stem in the studies on the climate of classroom are well known. Teacher and student verbal behaviors are observed, classified in 10 categories, entered into an interaction matrix.

The teacher talk contributes creating the social climate of the class through : (1) an indirect influence by praising, accepting suggestions and feelings by the students, asking questions; (2) a direct influence through lecture, direction and justification of authority.

The indirect influence fits the commitment of many education theorists seeing a better means to prepare students to become active and responsible adults in a changing society. Let us keep out associating necessarily influence with quality or effectiveness of teaching.

Some situations need an indirect influence, others benefit more from direct intervention.

Descriptive studies having used the F. I. A. S., (G. Nygaard, 1971, 1978) or a modified F. I. A. S. (N. Dougherty, 1970; J. Cheffers, 1972, 1974; M. Piéron & C. Drion, 1977; J. Cheffers and V. Mancini, 1978) have provided data worthy of being examined when considering teaching effectiveness.

(1) direct influence prevailed overwhelmingly (G. Nygaard, 1971; M. Piéron & C. Drion, 1977; J. Cheffers & V. Mancini, 1978). Teaching styles like command teaching, task teaching or teaching individual programs differed in indirect/direct ratio, amount of extended direct influence (N. Dougherty, 1970).

J. Brunelle (1973) confirmed this predominent direct influence with the Joyce observation schedule: direct approach, 92% — indirect approach, 8% in student-teachers.

(2) Primary interaction patterns were quite similar in most teachers.

Silence and/or conflusion — lecture — silence and/or conflusion (G. Nygaard, 1971).

Activity — lecture — demonstration — directions — activity (M. Piéron & C. Drion, 1977).

Extended teacher information giving and demonstration — narrow student response — teacher information giving — extended teacher direction — narrow student response (J. Cheffers and V. Mancini, 1978).

Fortunately individual differences are reported. An experienced teacher, analyzed 9 times showed more flexibility than a sample of ten student-teachers (M. Demarteau & M. Piéron, 1978). The ever changing physical education situation stems from a more flexible approach which does not appear in most of the teachers.

Secondary interactions patterns seemed to be more discriminative between teaching approaches and strategies.

(3) Significant differences between variables reflecting the climate of the class according to sex and teaching grade level were scarce (J. Cheffers, 1977; J. Cheffers & V. Mancini, 1978). J. Cheffers & V. Mancini (1978) put some doubts on the opportunity and adequacy of separate teacher training according to teaching level.

Context variables such as subject matter taught or class organization exert a stronger influence on teacher-student interaction than teachers' gender (M. Piéron, 1978).

(4) Discrepancies occurred in a category labeled silence and/or confusion in the F. I. A. S. This category represents periods when no talk between teacher and students happened, but students may take part in active game playing, exercising, practising, interacting between them or do nothing.

This category amounted to approximately 10% of the tallies in Nygaard's study, and to 30% in N. Dougherty and M. Piéron & C. Drion's data. What is the teacher doing during that time? At best, he assists, demonstrates, observes silently. The 40 teachers analyzed by W. Anderson & G. Barrette (1978) were observing 21.1% of the class time. The author is wondering what part they are taking in students learning?

2. Teachers' interventions

A profile of teachers interventions can be drawn from observation schedule simply in ranking them by order.

Educational theories, researcher concerns, different views on teaching stimulate the choice or the construction of observation systems. It is hard to shift from one system to another, to compare data dealing with categories labeled in the same way but covering different concepts. This comparison is only possible after carefully considering operational definitions of behaviors.

Nevertheless, a teacher behavior profile arises with enough accuracy to be used in teacher training or in in-service training. Some teaching functions are predominantly employed in the interaction. When intervening, a teacher organizes, informs, gives the learner some feedback; he exerts affectivity functions towards the student. All these interventions are not equal in importance from an educational standpoint.

a) organization (managerial) functions.

These interventions group statements dealing with providing equipment, discipline, behavior conduct of the class, the pace of exercises imposed by teacher, commands at the start and the end of an activity. They do not concern the content or subject matter taught.

A high level of managerial behaviors seems to be a characteristics of teaching physical activities. They often account for more than 20% of the total of tea-

ching verbal events (M. Demarteau & M. Piéron & J. Hacourt, 1979).

M. Stewart (1977), W. Anderson & G. Barrette (1978) confirmed this quantitative importance of the managerial function. J. Quarterman (1978) observed that 34% of class time was spent in organization.

The managerial behaviors reflect a praiseworthy concern to provide students with the best possible conditions to practice a skill and to repeat it as ma ny times as possible. They are prerequisite conditions to efficient learning. However, these behaviors do not produce a direct educational effect on the learner.

Authors agree that decreasing this amount of managerial intervention gains as much for the students as for the quality of the interaction (D. Siedentop, 1976; J. Brunelle, 1979; M. Piéron & J. Hacourt, 1979).

Studies directed by D. Siedentop aiming at teachers behaviors modification, show that frequency of organizational events and amount of time spent in management can be markedly reduced (C. Hughley, 1973; F. Rife, 1973; J. Boehm, 1974; J. Currens, 1977; C. Cramer, 1977).

Besides providing helpful conditions for learning and practice, organization functions must attempt to gain and maintain an active participation of the greatest number of students in a class. Positive affective teacher interventions fulfil some of these aims to benefit students' growth and development.

b) Content interventions.

Usually observation systems account for subject matter only through global and rather inaccurate categories. Observation schedules derived from F. I. A. S. consider the teacher lecturing, asking questions and utilizing students suggestions and ideas. W. Anderson & G. Barrette set apart preparatory instruction (14.2% of class time), and concurrent instruction (17.1% of class time), M. Piéron & J. Hacourt (1979) classify theses interventions in a content category (20 to 22%), and in development and (9—10%) categories dealing more with the students contribution.

Research data showed that teachers asked few questions regarding the cognitive content of physical activities. Knowledge of teacher-student interaction, does not allow the selection of variables reflecting the students growth or teaching effectiveness in content categories.

c) Functions of feedback.

Knowledge of results favors performance. It is a requisite condition to improve it. Some abilities include clues of self-evaluation, others are harder to estimate by the student. The teacher's ability to provide evaluation clues differ considerably. Sometimes, he wishes to complete intrinsic information or provide hints inaccessible to the student. The student rarely realizes at the first attempt the performance expected by the teacher. The latter issues information intending to change, to correct successive student trials.

Definition of feedback used by S. Fishman & W. Anderson (1971) fits our aims: »a teaching behavior dependent upon the motor response of one or more students and intended to provide information related to the acquisition or performance of a motor skill«.

Several observation schedules devote a category to feedback. Quantitative importance of feedback in teacher-student interaction appeared clearly in most studies. Using the observational system for the analysis of classroom interaction (Hough), M. Piéron & C. Drion (1977) observed that feedback accounted for 7.3% of the total amount of tallies and 9.0% of recorded events. It amounted to 17.3% of verbal interventions of the same teacher observed nine times; the variation ranged from 10.2% to 21.8% (M. Demarteau & M. Piéron, 1978).

In analyzing ice hockey instructors, J. Brunelle & coll. (1978) registered 23.53% of feedback. The analysis unit being the verbal event.

The optimistic view gained in considering some high proportions of feedback in the total amount of teacher intervention must be moderated.

Students observed by S. Fishman and C. Tobey (1978) issued barely more than one feedback every minute. However, a female teacher observed several times, issued a feedback every eleven seconds and student teachers one feedback every 18 seconds (M. Piéron & C. Devillers, 1978).

Feedback is predominantly single student oriented: 77% (S. Fishman & C. Tobey, 1978), 71.7% and 79.7% (M. Piéron & C. Devillers, 1978) of feedbacks were directed towards a single pupil. With some classes above 30 students, the author is wondering at what rate a student will be personally involved, receiving clues dealing with his performance.

Feedback may stand as central element of teacher-student interaction. S. Fishman & W. Anderson (1971), W. Harrington (1974), S. Fishman (1974), C. Tobey (1974), S. Fishman & C. Tobey (1978), M. Piéron & C. Devillers (1978) devised or/and used multidimensional analysis decribing mostly form, content, intent, general and specific referents and direction of feedback.

Large differences appeared in the structure of feedback. Approximately one fourth of total amount of feedback took an evaluative aspect by which teacher evaluates and confirms the learner's performance through a positive or negative sentence, but avoided providing some specific information related to the performance (M. Piéron, 1979). It seemed that the teacher intended to rate the performance rather than to look for some behavior changes by reinforcement technique. Fifty-three % of feedback were evaluative in the S. Fishman & C. Tobey study (1978).

Besides the evaluative aspect of feedback, the teacher chose to give information in which one aspect of each dimension prevailed largely: feedback was verbal, an emphasis was on the cognitive aspect of

content, a prescriptive intent was pursued, it was single student directed (M. Piéron, 1979).

In teachers from the video data bank project, feedback was auditory (95.2%) directed towards one student (77.3%), evaluative; it referred to the whole movement and to its spatial characteristics (85.1%), and finally predominantly negative (56.1%). Only the time of occurence was equally distributed: concurrent of movement (48.8%) and terminal (48.7%) (S. Fishman & C. Tobey, 1978). All these data reflected a stereotyped intervention.

As far as feedback is concerned, a crucial question challenges the teacher: does the feedback fulfil its aims to change the student behavior? We have associated different feedback dimension to observe students changes of behavior, in a physical education setting.

After eliminating the purely evaluative dimension, 51.3% (live observation) and 42.6% (videotape analysis) of feedback were accompanied by a short-term change in learner's performance.

It happened that ratio of observed students behavior changes significantly differed according to the character of feedback. For example, an auditory-visual feedback induced more changes than a purely auditory feedback, only non significant and inconclusive changes occurred when content and direction of feedback were considered (M. Piéron, 1979).

Too often, the amount of negative feedback exceeded positive evaluations (S. Fishman & C. Tobey, 1978; M. Piéron & J. Hacourt, 1979). Most positive evaluations were provided without any further comment. Many teachers justified their negative feedback by a specific information allowing the student to be more aware of his errors.

The teachers ability to provide the student with feedback could be a variable accounting for differences the teacher can produce. Feedback is supposed to be one of the teaching skills able to raise the effectiveness of teaching. J. Brunelle (1979) considered that it is badly mastered by teachers.

The author suggests to put forward some objectives: to provide more feedback, to seek out tasks including an intrinsic feedback, to better balance group or class feedback and individual feedback, to emphasize the positive aspects of students' performance.

STUDENTS BEHAVIORS

The importance of communication in transmitting knowledge plainly justifies the analysis of verbal interaction in a class, even in physical education. Nevertheless, one cannot guess student gains in relying only on teacher interventions or on verbal events and interactions.

Teaching will reach some effectiveness criterion only when students fulfil teaching objectives, master the skills previously practiced, reach social, moral and motor objectives of physical education. An ideal would be that teaching product would reflect these concepts. Inadequacy of tests and measurements in accounting for learning gains scarcely allows Process-Product types of studies. Some proxy for product variables are searched for in students behaviors.

Studies realized in the »Beginning Teaching Evaluation Study« (BTES«) pointed out positive relationships between learning gains and time spent on a task by students (B. Bennett, 1978). It is hazardous to transfer knowledge concerning learning of reading or elementary maths to physical education. However these results are an inspiring source of thinking for physical educators.

Systematic student observation remains still rare in physical education teaching. Few observation systems are available. In this domain, the Teachers College video data bank constitutes an extremely valuable source of information too.

1. Student activity time.

This variable is supposed to play a prominent role in student learning and in student adaptation to effort.

Students of elementary level classes took part in motor activities during 29.9% of class time (practice 15.3%, game playing 10.3%, exercise 3.6%, movement exploration 2%, expression-communication 5%) (J. Costello & S. Laubach, 1978). Results are quite similar in secondary level classes: 29.9% (M. Piéron & J. M. Haan, 1979). Student teachers obtained from their pupils less activity time: 24% (M. Piéron & A. Dohogne).

Large and significant differences occurred according to skill practiced: gymnastics, track and field or team sports.

Although pretty rough, this variable gives a first estimate of teaching effectiveness. It is usable in supervision. Some comparison standards are in great need. This variable must be refined like in ALT-PE project (D. Siedentop). Academic Learning Time (ALT) is »time spent by a student engaged on a task on which few errors are produced, and where the task is directly relevant to an academic outcome« (Fisher C. N. & coll., 1977). A major finding of BTES is that ALT is positively related with student learning gains.

As much as activity time or time-on-task, the number of practice trials plays a striking role in learning and mastering a skill.

2. Time spent in position and managerial episodes.

B. Bennett (1978) reported that »in well-organized classrooms, transitions lasted only a short time and the children seemed to transfer to another activity automatically. In contrast, transitional periods in less-organized classrooms tended to be chaotic, with

children wandering about, bumping into one another, confused and needing to ask the teacher what to do«. J. Brunelle (1979) selected this variable amongst 14 criteria examined in relation to teaching effectiveness. The variable was considered badly practised by teachers.

In elementary level classes, pupils spent 4.1% of class time for position, 3.4% in setting up, maintaining, dismantling and returning materials or equipment (J. Costello & S. Laubach, 1978). 5.8% of class time to managerial tasks had approximately the same meaning in M. Piéron & J. M. Haan's study.

Pupils taught by student-teacher spent 11.5% of their class time in non-substantive movement and 2.0% in dealing with equipment or materials (M. Piéron & A. Dohogne).

The differences occuring between experienced and beginning teachers tended to confirm the discriminative power of this variable. It will be advisable to decrease this amount of time involving no direct relationship with objectives of a physical education lesson.

3. Non-productive time.

Some behaviors considered as non-productive lasted a large amount of class time: 35.4% awaiting (J. Costello & S. Laubach, 1978), 32.1% awaiting and inacitivity (M. Piéron & J. M. Haan, 1979), 26% awaiting (M. Piéron & A. Dohogne, 1979), 6.8% inappropriate or undetermined interactions (M. Piéron & J. M. Haan, 1979). Four and an half % of time was spent in off-task behaviors and some part of 10.1% verbal interactions between pupils can be also viewed as non-productive.

More than teacher behavior, student observation variables have meaning in pursuing physical education objectives: activity time, number of trials on a skill, time-on-task, non productive time, off-task behaviors.

In a recent paper, Walker (1976) pointed out that »the next decade will see as much attention to what students do in classrooms as has been paid in the past decade to what teachers do«. That seems to be true in physical education too.

CHANGING TEACHER'S BEHAVIORS.

Descriptive studies of teaching emphasized several teachers behaviors that seemed unable to produce a desirable influence on students either by the climate they create or because they cannot induce learning gain.

Some of these behaviors can be changed. We hope that some can be extinguished.

Occasionnaly, teaching analysis was used as an independent variable. Keilty (1975) utilized C.A.F.I.A.S. as an indenpendent variable to study the effect exerted on student-teachers attitudes toward teaching and on perception the learners got from teachers' influence. This study intended to check if these student-teachers would use a more indirect approach after their training. The perception of teachers influence differed significantly between experimental and control groups. Student teachers from the experimental group were perceived as more pupil accepting and more indirect.

Some training programs, or intervention package including instructions on the nature of behavior categories, graphic feedback, cueing and reinforcement, modeling, and goal setting, changed some teaching specific behaviors: rates of managerial interventions, of negative reactions to students behaviors, of negative feedbacks sharply decreased. Positive feedback, positive reactions to student behaviors became more frequent (C. Hughley, 1973; F. Rife, 1973; J. Boehm, 1974). The multiple baseline was used to compare behavior rates during baseline and intervention.

Percentage of students actively engaged in learning increased (P. Darst, 1974). Most striking changes occurred in managerial interventions, active time, negative interactions, corrective feedback and students appropriate behaviors (J. Currens, 1977; C. Cramer, 1977).

CONCLUSIONS

(1) Descriptive studies of teaching physical education identified, clarified many teachers interventions; they specified the nature of verbal interactions occuring in class.

(2) Some knowledges of human behavior, data from academic teaching and intensive reflexion on supervision allow to infer the suitability of some interventions,, to propose a more frequent use of some events if one wish to increase teaching effectiveness: decrease negative intervention rate, provide students with more feedback and more positive reinforcement, create a more confident climate in the classroom and decrease managerial time.

(3) It seems logical to seek out the relationships between teacher interventions and his conduct of the class with learning gains of the pupils, or with some substitute variables of product such as time-on-task, ALT, non productive time, number of trails in a skill and inappropriate behaviors.

(4) Looking for an array of competencies and of effective teaching behaviors will improve teacher training. Their identification, their comparison in more effective and less effective teachers provides an important challenge for methodologists of physical education.