

A Category System for Teacher Behaviors

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The first of two interdependent articles describing joint research on teacher classroom behavior. Primarily dealing with the development of an instrument for systematic observation of teaching, it is advisable to read this article by Evans prior to reading the subsequent report by Balzer.

Introduction

One shortcoming looms above all others in the existing research on teacher classroom behavior. Researchers have largely been content to study verbal behavior, pretending that nonverbal behavior was either pedagogically irrelevant or that it did not exist. This has been true even though the most casual observer is aware that classroom teachers communicate both verbally and nonverbally to their students.

The reasons for this shortcoming are many. First, methods of recording or "capturing" teacher behaviors have been inadequate. Only recently has the portable video tape recorder become readily available. Prior to this the "capturing" of teacher behaviors was limited to narrative records, audio records, and, in some instances, 16 mm sound motion pictures. Secondly, teacher classroom behavior is so complex that researchers have limited their studies to certain behaviors, e.g., verbal. Thirdly, researchers have developed category systems for systematic observation based on theoretical models of the way teaching is or what it should be like. These systems were developed totally or partially in a deductive manner. As a result, certain observed teacher behaviors could not be properly encoded into the category system because they were not considered in the preconceived model.

Purpose

The study which is reported here was an effort to reduce the problem of disregarding nonverbal behaviors while studying teacher classroom behavior. The purpose was to test the following hypothesis: A reliable category system for firsthand

systematic observation of the verbal and nonverbal behavior of high school biology teachers can be developed for both classroom and laboratory instructional situations.

Procedures

Instrument Development

To develop the category system, 13 video tape recordings, each one-class period in length, were made of 11 high school biology teachers during their regular laboratory and classroom presentations. These recordings were viewed repeatedly by the researchers, and every teacher verbal and nonverbal classroom behavior, perceived as influencing the teaching-learning situation, was recorded on 3 x 5 cards. These were sorted and placed into piles containing a list of behaviors similar or related in their intent. These piles, after numerous revisions, were used to identify and define the individual categories and subcategories of teacher classroom behavior. For example, the behaviors in one pile included the following: (1) Looks up from work, (2) Stops walking, (3) Turns and stares, (4) Asks student to report after class, (5) Maintains or returns to authoritarian position, (6) Asks student to take his seat, and (7) States that time is running out. These behaviors tended to structure, regulate, or otherwise keep the student behavior and attention within limits. Consequently, the "Control Category" of teacher classroom behavior was identified and defined. The remaining categories were identified and developed in a similar manner resulting in the *Biology Teacher Behavior Inventory* (BTBI). Thus, the category system was developed in an inductive manner, i.e., it progressed from a narrative

list of teacher classroom behaviors to the individual categories and finally to the BTBI. The actual lists of behaviors were combined and became a glossary of teacher classroom behaviors.

The completed instrument (see Tables 1 and 2) contained the following categories: (1) Management, (2) Control, (3) Release, (4) Goal Setting, (5) Content Development, (6) Affectivity, and (7) Undecided. Routine, laboratory, and study management were the subcategories of management. Content development was either teacher centered (5a), or student centered (5b). Teacher centered and student centered content development was subdivided into procedures (5-1), knowledge (5-2), scientific process (5-3), tentativeness of knowledge (5-4), generalizations (5-5), articulation of content (5-6), and facilitates communication (5-7). Each of these subdivisions could be communicated in one or more of the following ways: (a) States, (b) Asks, (c) Shows, (d) Acknowledges, and (e) Clarifies. Negative (6a) and positive affectivity (6b) were the subcategories of affectivity.

Encoding Process

The method of encoding consisted of viewing the video tape recording and identifying, classifying, and recording teacher classroom behaviors onto a data record. There was no time limit placed on the initial observing, classifying, and recording of behaviors. The video tapes were replayed as often as the observer felt necessary to keep a running account of every pedagogically relevant teacher classroom behavior. The encoded behaviors were recorded on the data record in rows, top to bottom, to preserve the sequence of behaviors.

The behaviors were classified into the BTBI according to the inferred intent of the behavior and according to one of four expressional forms: verbal, nonverbal, congruent, and contradictory behaviors. Verbal behavior was the oral language that a teacher used in the teaching-learning situation. Nonverbal behavior was that segment of teacher classroom behavior other than the use of oral language. It included gestures, use of silence, facial expressions, timbre and inflections of voice, and spatial relationships with students. Congruent behavior was defined as simultaneous verbal and nonverbal behaviors in agreement, i.e., one set of behaviors was used to stress, reinforce, or amplify the other. Contradictory behavior was simultaneous verbal and nonverbal behaviors inconsistent with one another.

Time Intervals

Time intervals were used to condense the voluminous quantity of data obtained by keeping a second-by-second account of teacher classroom behavior. In addition, time intervals provided a more accurate description of teacher classroom behavior. For example, if a teacher exhibited a management be-

havior for one minute and a control behavior for only ten seconds, the precise situation would not be accurately described by saying that one management and one control behavior were observed.

The encoded data record contained a running account of teacher classroom behaviors making any number of time intervals available. The time interval that was decided upon was found in the following manner. First, a five-second interval was used, but it revealed that many teacher behaviors were not completed in five seconds. Secondly, a fifteen-second interval was tried and found to be too long, i.e., a large number of behaviors were being lost. Finally, a ten-second interval was tried and proved to be long enough for the completion of most behaviors and not so long as to lose many of the short behaviors. Thus, the ten-second interval was found to be an acceptable unit for observation of teacher classroom behavior.

An audio tape was prepared to beep every ten seconds. The video tapes, which had previously been encoded, and the audio tape were simultaneously played without stopping. The observer followed the completed data record as the video tape replayed and drew a horizontal line every ten seconds or when the audio recorder beeped. This procedure was followed until the entire video tape recording was replayed. In this manner, the encoded behaviors were separated into ten-second intervals on the data record. The predominant behavior for each interval was determined by the behavior which consumed the largest portion of the ten-second interval.

Inter-Observer Agreement

Fifteen, five-minute samples of behavior were drawn at random from thirteen video recordings, and each sample was independently observed and encoded by two observers. Inter-observer agreement was calculated using Scott's formula (1955) and was found to be .92. Inter-observer agreement was rechecked at midpoint and again at the end of data collection and found to be .95 and .93, respectively.

Data Collection

Once the BTBI and method of encoding were developed and a high level of inter-observer agreement was obtained, they were used to study the classroom behavior of eight high school biology teachers. Four BSCS teachers and four non-BSCS teachers were chosen, representing 5 schools and 2 school systems. Forty video tape recordings were made of the 8 teachers, 5 for each teacher, over a period of 3 months. Both laboratory and classroom instructional periods were recorded, and each tape represented one class period in length. The tapes were analyzed using the devised category system and the stated method of encoding.

Results

One major result of this study was the BTBI. The

Table 1
Categories and Subcategories of Teacher Classroom Behavior

<i>Categories and Subcategories</i>	<i>Definitions</i>
1.	Management: Those behaviors that regulate the routine "housekeeping" activities which are used in the operation of the biological science classroom. In addition, this category includes those behaviors in which the teacher makes assignments, since those behaviors comprise an aspect of management in the learning situation.
1a.	Routine Management: Those behaviors of the teacher associated with the routine management of any classroom. Behaviors involved in the control of the physical environment and the execution of administrative details are illustrative of this subcategory.
1b.	Laboratory Management: Those behaviors of the teacher associated with preparation for, maintenance and supervision of, or clean-up from biological science laboratory, demonstration, or classroom activities.
1c.	Study Management: Those behaviors of the teacher which specify assignments or provide for directed study.
2.	Control: Those behaviors that intend to make the classroom activities more orderly or formal. They tend to structure, regulate, or otherwise keep student behavior and attention within limits, i.e., teacher behaviors that intend to have students follow a recommended course of action.
3.	Release: Those teacher behaviors that intend to make student behavior less formal and orderly. They tend to allow greater student control of attention and discipline, i.e., those teacher behaviors that increase informality and permissiveness in the classroom.
4.	Goal Setting: Those behaviors which explicitly deal with the stating, explaining, implying, or clarifying of the purposes or goals for a given individual or classroom activity.
5.	Content Development: Those behaviors dealing primarily with subject matter in the science classroom. These behaviors are based upon efforts to achieve objectives related to content whether they are cognitive, psychomotor or affective.
5a.	Teacher Centered: The classroom is teacher centered when the attention of most students is on the teacher, or the teacher is attempting to obtain the attention of most students in the classroom. In addition, behaviors comprising teacher assertiveness in relation to individual students or groups of students are teacher centered even though the remainder of the students may be involved in student centered activities.
5b.	Student Centered: Those behaviors dealing primarily with subject matter other than those covered in teacher centered content development.
6.	Affectivity: Those behaviors that intend to elicit and reinforce, positively or negatively, contributions to the teaching-learning process by an individual or group of students.
6a.	Positive Affectivity: Those behaviors that elicit and reinforce, in a positive manner, contributions by an individual or group of students to the teaching-learning process. These behaviors take the form of teacher recognition, encouragement, and/or praise; they are based on the positive aspects of teacher motivation and evaluation.
6b.	Negative Affectivity: Those behaviors that elicit, correct and reinforce, in a negative manner, contributions by an individual or group of students to the teaching-learning process. These behaviors take the form of corrective feedback, criticisms, reprimands, accusations, admonition, and/or willful disregard; they are based on the negative aspects of teacher motivation and evaluation.
7.	Undecided: Those behaviors whose intent can not be inferred and categorized into the other categories in the system.

instrument is organized into the following related but distinct sections: (1) List of categories, subcategories, and subdivisions of teacher classroom behavior, (2) Definitions, and (3) Glossary of teacher classroom behaviors. Table 1 presents categories and subcategories of teacher classroom behavior and their definitions. Table 2 contains the subdivisions of teacher centered and student centered content development. The glossary is not included because it is so extensive. A complete description of the instrument is provided in the research by Balzer (1968) and Evans (1968).

Table 3 provides a description of the eight biology teachers' behavior in both classroom and laboratory instructional situations. The biology teachers spent 94.15% of their time in the areas of content development and classroom management, with 5.85% of their behaviors devoted to other categories of teacher classroom behavior. Only .09% of the observed behaviors were included in the "Undecided Category."

These percentages were calculated from the total number of predominant behaviors for each teacher and for all teachers.

Table 4 contains the percentage of teacher behaviors in various expressional forms. It reveals that the majority of the eight biology teachers' behavior, 38.94%, was nonverbal. These data are presented because they provide evidence that one cannot realistically observe a classroom session and conclude that there is no influential nonverbal behavior.

Discussion

The hypothesis was supported by the development of the BTBI, since the instrument met the requirements of a category system. It included verbal and nonverbal behaviors, and reliability, defined as inter-observer agreement, was found to be .92.

This category system was defined as a set of mutually exclusive categories exhaustive of teacher

Table 2
Subdivisions of Teacher Centered and Student Centered Content Development

<i>Subdivisions</i>	<i>Definitions</i>
5-1. ^a <i>Procedures</i> :	Those behaviors of the teacher concerned with instruction in procedural aspects of the content. Illustrative are behaviors involved in instruction in laboratory procedures and procedures in problem solving.
5-2. <i>Knowledge</i> :	Those behaviors of the teacher which pertain to giving and receiving information at low cognitive levels. The principal concern is that of knowledge of specific aspects of content such as facts, definitions, and terminology as contrasted with interpretation, extrapolation, application, analysis, synthesis, observation, and evaluation.
5-3. <i>Scientific Process</i> :	Those behaviors of the teacher which pertain to such cognitive processes as observation, interpretation, extrapolation, application, analysis, synthesis, and evaluation as contrasted with knowledge of relatively specific information such as facts, definitions, and terminology.
5-4. <i>Tentativeness of Knowledge</i> :	Those behaviors in which the teacher states or distinctly implies a state of change regarding scientific knowledge.
5-5. <i>Generalizations</i> :	Those behaviors which are of considerable scope or breadth as contrasted with specificity and depth of other content considerations being undertaken by the teacher. Operationally, these behaviors may be explicitly described by the teacher or may be identified by the observer on the basis of his acquaintance with teacher behavior and the content under consideration.
5-6. <i>Articulation of Content</i> :	Those behaviors through which the teacher attempts to establish continuity across topical areas or time. Articulation and integration of topical areas may be within biology or between biology and other areas of knowledge. When generalizations or summarizations are used as means of articulation and integration of content, the behaviors are classified on the basis of the latter intent.
5-7. <i>Facilitates Communication</i> :	Those behaviors in which the teacher attempts to make clear and distinct the nature of communication. These can be distinguished from explanations and illustrations of content as such in that the latter pertain to examples and elaborations, given to aid understanding of the nature of the content. Hand motions and voice pitch intended to draw attention to content are seen as facilitating communication. However, when such non-verbal behaviors illustrate content, they must be categorized as such, not as facilitation of communication.

^aThe hyphen (-) is used to indicate that the subdivision can be either teacher centered or student centered content development.

classroom behaviors which were perceived as influencing teaching-learning situations. A category for this system was defined as a domain or division into which specific behaviors could be classified. The boundaries or limits of a category were stated and understood to include certain behaviors and to exclude all others.

The BTBI met the stated definition of a category system largely because of the manner in which it was developed. Individual teacher behaviors were used to arrive at the categories and were combined

into a glossary of total behaviors. An "Undecided Category" was included in the category system to make it logically exhaustive of all teacher behaviors which influenced teaching-learning situations. Actually, the category system proved to be largely exhaustive of teacher behaviors without the "Undecided Category" (see Table 3). Evidence for a confidence in the mutual exclusiveness of the individual categories was the high level of inter-observer agreement.

Objectivity is a major concern in any study of classroom behavior. It is defined as the ease of discrimination, i.e., can independent observers, after

Table 3

Percentage of Teacher Behaviors in Various Categories

Teacher	Categories ^a						
	1	2	3	4	5	6	7
1	45.14	4.35	0.66	0.46	47.89	1.40	0.06
2	52.82	1.54	1.81	0.53	41.85	1.41	0.00
3	32.29	0.62	1.73	1.52	63.54	0.27	0.00
4	51.52	0.86	1.06	0.33	44.34	1.86	0.00
5	57.00	3.29	0.71	0.51	38.15	0.32	0.00
6	12.99	2.16	4.06	1.83	75.13	3.74	0.06
7	63.31	2.04	1.16	0.54	31.62	0.68	0.61
8	39.67	0.75	1.44	0.75	55.99	1.31	0.06
1-8	44.29	1.95	1.58	0.81	49.86	1.38	0.09

^a1. Management, 2. Control, 3. Release, 4. Goal Setting, 5. Content Development, 6. Affectivity, and 7. Undecided.

Table 4

Percentage of Teacher Behaviors in the Various Expressional Forms

Teacher	Verbal	Congruent	Nonverbal	Contradictory
1	48.82	17.81	33.35	0.00
2	24.83	41.11	33.91	0.13
3	41.30	34.65	24.04	0.00
4	28.19	25.93	45.81	0.06
5	32.21	13.75	53.97	0.06
6	45.34	18.37	35.82	0.45
7	22.33	23.77	53.82	0.06
8	34.90	34.46	30.57	0.06
1-8	34.76	26.18	38.94	0.10

a period of training, obtain satisfactory agreement with each other on the identification and encoding of teacher classroom behaviors. The study illustrated objectivity by the high level of agreement reached by the two observers. The reasons for this high level of agreement stemmed back to the development of the instrument and method of encoding. First, a video tape recorder was used to "capture" teacher classroom behaviors. The "captured" behaviors were observed as often as the observer desired. Secondly, the instrument was inductively developed. Teacher behaviors were first identified and became the basis on which the categories and subcategories were identified and defined. Thirdly, the method of encoding enabled the predominant behaviors for each time interval to be empirically, rather than subjectively determined.

The inductive approach to category system development, coupled with the assistance of a video tape recorder, demands that nonverbal behaviors be included since they are readily observable (see Table 4). It questions the assumption that verbal behavior is an adequate sample of teacher classroom behavior. The inductive approach further reveals that teaching methods, such as demonstrations, are not one but a combination of teacher behaviors, and it prohibits the classification of silence

as a lack of behavior.

The BTBI was developed in an inductive manner and was formulated on a broad and empirical base. As a result, it is more inclusive of teacher classroom behaviors than many of the earlier instruments for systematic observation of teacher classroom behavior. Verbal and nonverbal behaviors, and combinations of these, are included in the instrument because they were observed prior to and during instrument development.

■ REFERENCES

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ADVERSE REACTIONS TO LSD

What kind of person takes LSD without medical supervision? Does he really suffer as many ill effects as have been claimed?

Reporting on what they believe to be one of the largest groups of LSD-related adverse reactions studied to date, investigators at the University of California, Los Angeles, describe 70 persons treated after unsupervised LSD administration. The report appears in the August 8, 1966 issue of the *Journal of the American Medical Association*.

The patients were "predominantly single, white, male, and young (average age, 21)," the report said. Most were from the Los Angeles area, and most were either unemployed or students. All were treated during the seven-month period from September, 1965, to March, 1966.

In every case, the victim experienced one or more severe reactions, such as anxiety, depression, or confusion, after the LSD's effects should have worn off. More than half were admitted to the UCLA Neuropsychiatric Institute after receiving emergency treatment. Even in this facility, designed for short-term treatment, most hospitalized patients remained for more than a month.

The authors say they share general concern over what appears to be a rising number of LSD-related

disabilities. The 70 cases treated at UCLA constituted 12% of the Institute's patients during the seven months. Prior to mid-1965, an LSD case there was a rarity, the authors said.

Patient numbers did not decrease when the new Federal Drug Abuse Control amendments went into effect in February 1966. In fact, March was the clinic's busiest month for LSD cases.

LETTERS TO THE EDITOR

Dear Editor:

Since I am currently teaching BSCS Green Version Biology, I began Edwin Fakier's article on this same program at Thibodaux High School in the October, 1968 issue of the *ABT*, with interest.

I wonder, if any other readers were impressed with the irony of the following quote from that article:

"The students were *told* (emphasis mine) that BSCS biology was a "show" rather than a "tell" biology and that they *should accept the idea* of "science as enquiry" of inquiring and developing answers and solutions through understanding."

I was.

Very truly yours,
Mrs. Stephen Brown