

CATCH Institutionalization

SOFIT PROTOCOL

SOFIT **(System for Observing Fitness Instruction Time)**

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I. INTRODUCTION

SOFIT is an objective tool for assessing the quality of physical education instruction (1). It is a comprehensive system that provides a measure of student activity, lesson context, and teacher behavior during class time.

SOFIT involves the direct observation of lessons by trained observers and has been used to assess physical education in over 300 schools throughout the United States. These include the CATCH (3,4,5), M-SPAN, and SPARK (2,8) Projects which are three intervention studies supported by the National Institutes of Health. The main focus of SOFIT is on the coding of student physical activity levels and selected environmental factors (lesson context and teacher behavior) that are associated with opportunities for students to be physically active and become physically fit.

SOFIT student physical activity codes have been validated by both heart rate monitors (1,10) and CALTRAC accelerometers (6). Lesson context and teacher behavior categories have been developed from definitions used commonly in physical education evaluation research (9). Reliabilities for independent trained observers have consistently exceeded 90% agreement on all SOFIT categories, which indicates the measures are accurate (1,2,4,5,8).

SOFIT enables teachers, supervisors, and researchers to make judgments about physical education lessons, particularly as they relate to program goals. When making decisions, it is important that evaluators consider that SOFIT variables can be affected by a number of factors, including those in Table 1.

Table 1. Factors influencing SOFIT data.

Instructional goals	-fitness, skill, knowledge, social/emotional development
Instructional content	-type of unit -lesson placement in unit
Class characteristics	-size -diversity
Environmental conditions	-size and location of instructional space -equipment and supplies -weather

SOFIT was originally conceptualized as a three phase decision system. The first phase requires a decision to be made on the activity levels of individual learners. The learner involvement decision is made by observing a preselected student and **determining his/her level of physical activity** (active engagement level). The engagement level provides an estimate of the intensity of the child's physical activity and uses the activity codes from BEACHES (McKenzie et al., 1991). Codes 1 to 4 (lying down, sitting, standing, walking) describe the body position of the child and code 5 (very active) identifies when the child is expending more energy than he/she would during ordinary walking.

The second phase of the decision sequence involves coding for the **curricular lesson context** of the class being observed. For each observation sample (10-second interval) a decision is made as to whether class time is currently being allocated for general content (M) (such as management) or for actual subject matter (physical education) content. If substantive physical education content is occurring an additional decision is necessary to determine whether the class focus is on knowledge content coded as either general knowledge (K) or physical fitness knowledge (P) or motor (physical activity) content. If motor content is occurring, a further decision is necessary to code whether the context is one of fitness (F), skill practice (S), or game play (G). During free play or recess, when physical education instruction is not intended, other (O) is coded.

Data on teacher behavior are not being collected for CATCH, therefore additional information in that categorization system is not included in this description.

II. SAMPLING SCHEME

- A. SOFIT observations will be conducted during physical education classes in all of the CATCH-ON schools (i.e., 22 schools per field site; 88 schools study-wide).
- B. Each site should have two certified SOFIT observers.
- C. During the semester (spring 1999), each school must be observed for two full days. During the semester each school will be assigned two randomly selected weeks, in which to complete the two days of observations. Sites may schedule observations on any day within each week selected. The two weeks randomly selected may not be consecutive.
- D. Observation days should be spread out over the entire semester. Only full school days during which physical education is scheduled should be selected for observation. Selected full days during which physical education is scheduled but cannot be taught (e.g. inclement weather) should be rescheduled.
- E. Within the week prior to the visit observers will obtain the schedule of PE classes.
- F. On the day of the visit observers will complete as many SOFIT observations at the school as possible. Observers should select classes to obtain a representation of the physical education taught in the school. This should include: 1) lessons from grades 3, 4, and 5; 2) a representative distribution of classroom teachers and physical education specialists; and 3) as many different teachers as possible (if many teachers teach PE).

III. MEASUREMENT PERIOD Spring 1999 (01/01/99 - 06/30/99)

IV. CATCH SOFIT METHODOLOGY (1999) – OVERVIEW

NOTE: The main use of SOFIT during 1999 is to generate data on student activity level and lesson context.

- A. **Data Collection:** Use standard 10 second observe/ 10 second record interval format. During each interval an observer codes student activity and class context for the two phases simultaneously.
- B. **Instrumentation:** Use a tape player with a prerecorded audio-cassette tape to pace the observations. Wear a fanny-pack to hold equipment so your hands are free and use an ear jack.
- C. **Observation Technique:** Use momentary time sampling by coding **Student Activity and Lesson Context** at the signal to end the interval.

- D. Interval Length:** Alternating observe/record intervals of ten-second duration pace the observations. (This yields three student activity and three class context observations per minute or 90 observations each during a half-hour class.)
- E. Sampling System:** Select five target students for each observed class. Rotate focus among four target students after observing each one for four consecutive minutes. This yields 12 observations per student in one 4 minute interval and 24 observations per student each 32-minute class. Observe the fifth selected student if one of the first four leaves the class location. Begin the observation period when greater than 50% of the class has reached the instructional station and continue until half the class has departed from the area.
- F. Data Yield:** Percent of intervals observed for each category will permit comparisons to be made across different classes over time.
- G. Data Scoring:** Enter data on CATCH SOFIT Lesson Observation Forms and tabulate them by hand. On each record signal (every 20 seconds) circle one code each for the student activity level and lesson context of the observed student.

Sample Coding Sheet

Interval	Student Activity	Lesson Context
1	12345	MKPFSGO
2	12345	MKPFSGO

V. DIRECTIONS FOR CATCH SOFIT OBSERVERS (7/30/91)

A. Warming-Up:

Arrive on site and be prepared to collect data at least ten minutes before the announced time for start of class. Warm-up by mentally rehearsing or actively practicing using the coding system.

B. Materials Preparation:

Before the class starts be sure you have pencils, a clipboard, ample SOFIT observation sheets, a PEOF form, portable tape player, ear jack, fresh batteries, and a pre-recorded audio tape to pace your observations. Wear a fanny pack to hold the tape player. It is wise to have an additional tape recorder and a second copy of the pacing tape available for emergencies.

1. Audiotape player (reliable, small)
2. Batteries (preferably rechargeable batteries; each observer carries additional fresh batteries and has a battery charger)
3. Earphones (two)
4. Phone jack adapter ("Y" variety; for reliabilities - non stereo type preferred, for example Radio Shack Cat No. 274-310)
5. SOFIT pacing tapes, at least two per observer (three @ 30 minutes per side; three @ 45 minutes per side will be provided to each center--copy as needed)
6. Clipboard, stapler, and pencils
7. Fanny pack (to protect equipment and keep hands free)

C. Target Child Selection:

Select 5 students that are representative of the class as possible targets for observation. As students arrive at the instructional station, select students 4, 8, 12, 16 and 20 for classes with fewer than 25 students and numbers 5, 10, 15, 20 and 25 for classes with more than 24 students. Note identifying characteristics of each student on the SOFIT Lesson Observation Form so the selected students can be located later. Circle M or F on the Lesson Observation Form to indicate whether the student is male or female. Sequentially (in turn), observe the first four students for a four minute period; reserve the fifth student as a backup replacement in case one of the first four leaves the observation environment.

D. Observation Procedures:

1. The target student is the major focus of this observation. However, place yourself in a position so that you can observe what the class as a whole is doing. Be as inconspicuous as possible and do not interfere with class activities. Be prepared to relocate frequently.
2. Start the tape player and begin observing when greater than 50% of the expected number of students reach the instructional station (gymnasium or designated outdoor space). Write the start time on the SOFIT Lesson Observation Form.
3. Observe the target student activity and the lesson context throughout the 10 second observe interval. Circle the appropriate symbols on the CATCH SOFIT Lesson Observation Form during the 10 second record interval to indicate what the student was doing and the lesson context at the beginning of that record signal.

4. Observe Student One for four minutes (12 observations), then Student Two for four minutes. Continue in this manner until class ends, rotating the focus on the four target students every four minutes.
5. End observing when greater than 50% of the students have departed the instructional area. Record end time on the SOFIT Lesson Observation Form.
6. Rewind or turn over the audiotape.
7. Data should be representative of the entire class period. Even in emergency situations (e.g. can't find class), do not begin observations if the targeted class has been underway for over five minutes.

E. Data Summary

1. Complete all requested information on the SOFIT Lesson Observation Form.
2. Tabulate (sum) and record the total for each of the 12 coding categories at the bottom of each Lesson Observation page (under page totals) on the SOFIT Lesson Observation Form.
3. Transpose the page totals from the Lesson Observation Form onto the SOFIT Lesson Summary Form.
4. Calculate totals (horizontally) and record PERCENT for each category. (Divide the sum under TOTAL by the total number of observations and multiply by 100).
5. Attach forms in the following order: 1) SOFIT Lesson Observation Form; 2) SOFIT Lesson Summary Form; and 3) all reliability forms in same order.
6. Return all forms to the Study Center Data Manager using the SOFIT School Visitation Summary Form as the cover page for each day's observations.

F. Reliability Measures

1. 10 - 15 % of SOFIT lessons will be coded independently by two observers.
2. Two observers will record simultaneously. The data coded by the head observer will be designated for CATCH analysis; the other will be used for reliability purposes only.
3. To perform the reliability checks, use a single tape recorder to pace both observers. Insert a y-adaptor into the audio-out and attach two ear jacks to it.
4. Inter-observer reliability coefficients will be calculated separately for Student Activity Level and Lesson Context.

5. Inter-observer agreement scores (reliabilities) will be calculated on an interval by interval basis.
 - a. (Observers) Match SOFIT Lesson Observation Forms by date, class teacher, page, and interval.
 - b. (Observers) On the reliability observer's Lesson Observation Form, mark a red square to indicate any instance of disagreement for student activity and lesson context during each interval.
 - c. (Observers) Total the number of disagreements (red squares) and agreements for student activity and lesson context at the bottom of each page of the reliability observer's Lesson Observation Form.
 - d. (Observers) Summarize the pages and report for the entire lesson observed by completing the following table on the reliability observer's SOFIT Lesson Summary Form.

	Total # Observations	Total # Disagreements	Total # Agreements	Percent (%) Agreement
S. Activity				
L. Context				

- e. (Observers) Calculate the reliabilities (percent agreement during entire class) using the formula below:

$$\# \text{ Agreements} / \# \text{ Observations} \times 100 = \text{XX.X}\%$$

Example for 30 minute class:

Student Activity	Lesson Context
$85/90 \times 100 = 94.4\%$	$79/90 \times 100 = 87.8\%$

- f. (Observers) Attach all SOFIT Forms as directed and return to Center Data Manager.
- g. (Center Data Manager) File Lesson Summary Forms at the study center for access locally and by the Coordinating Center.

VI. SOFIT DEFINITIONS AND CODING CONVENTIONS (7/91)

A. Overview

At the end of each 10-second observation interval the observer circles one code for each student behavior and lesson context. The two-phase decision system for CATCH is summarized below:

1. Phase 1. Student activity decision.

What is the physical nature of an individual learner's engagement?
 What is his/her activity level?

Choices: 1 = lying down
 2 = sitting
 3 = standing
 4 = walking
 5 = very active

2. Phase 2. Lesson context level decision.

What is the context of the lesson? How is time allocated for the class as a whole (greater than 50% of the students)?

General Content (M)	Knowledge Content	Motor Content
management transition break	general knowledge (K) (rules, strategy, technique, social behavior) fitness knowledge (P)	fitness (F) skill practice (S) game play (G) other (O)

B. Student Activity

1. Code the activity level body position of the individual target child into one of the five categories using momentary time sampling (i.e., code a number to indicate what the student was doing at the "record" signal):

Choices: 1 = lying down
 2 = sitting
 3 = standing
 4 = walking
 5 = very active

2. **Code levels 1-4** (lying, sitting, standing, walking), unless the student is expending more energy than that required for an ordinary walk.

3. **Code level 5** (very active), for any activity in which the student is expending more energy than he/she would during ordinary walking; do not consider body position only. For example, code 5 (very active-e.g., running, jogging, skipping, hopping) if the student is wrestling with a peer (even though he is lying on his back) or pedaling a moving tricycle or stationary bike (even though sitting).
4. When the student is in transition from one category to another, enter the code for the higher category. For example, code 2 if at the record signal the student is partially lying down and partially sitting up; code 3 (standing) if the student is getting up from either sitting or lying down.

C. Lesson Context (Modified from Siedentop et al, 1982)

Code the lesson context that the majority of class members (greater than 50%) are engaged in using momentary time sampling (i.e., circle M, K, P, F, S, G, or O to indicate what the class was doing at the "record" signal).

1. General Content (M)

Refers to class time when students are not intended to be involved in physical education content (either knowledge or movement). General content includes transition, management, and break times. Transition refers to time allocated to managerial and organizational activities related to instruction such as team selection, changing equipment, moving from one space to another, changing stations, teacher explanation of organizational arrangement, and changing activities within a lesson. Management refers to time devoted to class business that is unrelated to instructional activity such as taking attendance, discussing a field trip, or collecting money for class pictures. Break refers to time devoted to rest and/or discussion of non-subject matter related issues such as getting a drink of water, talking about last night's ball game, telling jokes, celebrating the birthday of a class member, or discussing the results of a class election.

2. P.E. Knowledge Content

Refers to class time when the primary focus is on knowledge related to any aspect of physical education rather than on activity itself. Either Physical Fitness knowledge (P) or General Knowledge (K) may be coded.

- a. **Physical fitness (P)** is coded when the knowledge content includes information related to physical fitness concepts.
- b. **General Knowledge (K)** is coded when the information transmitted relates to areas of physical education other than physical fitness, such as history, technique, strategy, rules, and social behavior.

3. P E Motor Content

Refers to class time when the primary focus is on motor involvement in physical education activities. Coded categories include fitness (F), skill practice and scrimmage (S), and game play (G).

a. **Fitness (F)**

Activity time devoted to activities whose major purpose is to alter the physical state of the individual in terms of cardiovascular endurance, strength, or flexibility. This includes aerobic dance, calisthenics, distance running, weight training, agility training, fitness testing, and warm-up and cool down activities. Relays conducted with more than three per team are coded as games (G), not fitness.

b. **Skill Practice (S)**

Activity time devoted to the practice of skills with the primary goal of skill development (e g., passing drills in volleyball, exploring movement forms, and practicing dribbling a basketball, dance steps, or a skill on a balance beam). Included also is time devoted to the refinement and extension of skills in an applied setting (like the one in which the skill is actually used) and during which there is frequent group instruction and feedback.

c. **Game play (G)**

Activity time devoted to the application of skills in a game or competitive setting when participants perform without major intervention from the instructor, such as in a volleyball or tag game, and a folk dance performance.

d. **Other/free play (O)**

Refers to free play or recess periods when physical education instruction is not intended.

NOTE: Transition time within an activity is coded as part of that activity rather than as management (M). For example, time spent moving from one fitness station to another is coded (F), and changing sides of the court during a volleyball game is coded (G).

VII. SOFIT OBSERVER TRAINING AND CALIBRATION

A. OBJECTIVES

1. By the end of training and periodically throughout the study, SOFIT observers should be able to code precoded assessment videotapes with accuracy scores of at least 80% for Student Activity and Lesson Context.
2. In the field, trained SOFIT observers should be able to obtain interobserver agreement scores of at least 80% for both Student Activity and Lesson Context.

B. MATERIALS PROVIDED PER CENTER

1. Videotape #1. Sample video segments (for training and discussion).
2. Videotape #2. Observer assessment and calibration (segments are coded; these codes are not to be disclosed to observers).

C. SOFIT TRAINING

Observers will be trained by Center CATCH staff. Training will include but is not limited to:

1. Study and memorization of SOFIT codes.
2. Practice using all SOFIT supplies and equipment (recorders, audio tapes, batteries, data recording and summary forms).
3. Coding and discussion of videotaped segments.
4. Field practice using all equipment and supplies.
5. Reliability measurement and calculation during field practice.
6. Coding of prerecorded Observer Assessment and Calibration videotaped segments.
7. Additional training and practice until observers reach criterion (80%) on Observer Assessment and Calibration videotaped segments.

D. RETRAINING AND CALIBRATION

1. Observers will code precoded videotape segments at least twice per measurement period (semester). Observers scoring below criterion will be retrained.
2. Observers will have 10-15 percent of their observations simultaneously coded by a second observer. Observers falling below criterion (80% agreement) will be retrained.

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