

SOFIT

(System for Observing Fitness Instruction Time)

Generic Description and Procedures Manual

**Thomas L. McKenzie, Ph.D.
School of Exercise and Nutritional Sciences
San Diego State University
San Diego, CA 92182**

tmckenzie@sdsu.edu

June 1, 2009

INSTRUMENT PURPOSE: To obtain simultaneous objective data on student activity levels, the lesson context in which they occur, and how teachers interact regarding promoting physical activity and fitness during physical education, exercise classes, and sport practices.

ACKNOWLEDGEMENTS: I wish to thank James Sallis (San Diego State University) and Patty Strikmiller (Tulane University) for their assistance and support with SOFIT since 1990.

Table of Contents

Page	Topic
3.	Introduction
4.	Factors in Selecting Lessons for Observation
5.	Observer Training, Reliability, Reactivity
6.	SOFIT Technical Description
8.	SOFIT Methodology
8.	SOFIT Definitions and Coding Conventions
10.	Teacher Interactions
11.	Teacher Involvement Categories
12.	Practical Directions for Observers
15.	Reliability Checks
16.	Completing the Observation Form
18.	SOFIT Recording Form
19.	SOFIT Summary Form
20.	SOFIT Coding Conventions
22.	PEOF Protocol
24.	PEOF Recording Form
25.	Cancelled Lesson Form
26.	Data Tracking Form
27.	SOFIT References
29.	SOFIT Pacing Cues
30.	SOFIT Observer Training DVD

1. INTRODUCTION

SOFIT (System for Observing Fitness Instruction Time) is a comprehensive tool for assessing physical education classes by providing for the simultaneous collection of data on student activity levels, the lesson context, and teacher behavior. Physical activity engagement is one of the main health-related goals of physical education and it is needed in order for students to become physically fit and physically skilled. Participation in moderate-to-vigorous physical activity (MVPA) during class is highly dependent upon how physical education subject matter is delivered (i.e., lesson context) and the instructor delivering it (i.e., teacher behavior).

SOFIT has been validated in several ways and studies have shown that it can be used reliably in diverse instructional settings. It has been frequently used as direct observation measurement system to provide both practitioners and researchers with both objective baseline and intervention data. This includes information on:

Outcome variables:

1. Student physical activity levels: number of minutes and % lesson time spent in MVPA (moderate-to-vigorous PA); VPA (vigorous PA); lying down, sitting, standing, and walking; estimated energy expenditure per lesson (kcal/kg); and estimated energy expenditure rate (kcal/kg/min)

Process variables:

1. Schedule of PE: Frequency of lessons and adherence to schedule (i.e., cancelled lessons); duration of scheduled and actual length of lessons
2. Lesson Context: minutes and % lesson time spent in management, instruction, fitness, skill drills, game play, and other
3. Instructor Behavior: % lesson intervals spent promoting activity and fitness during and out-of-class time.

SOFIT enables researchers, teachers, and supervisors to make judgments about physical education lessons, particularly as they relate to program goals. The protocols identified here are for a generic study. Individual researchers need to design adaptations that will best answer their study goals.

2. SCHEDULE OF ASSESSMENT (TO BE DETERMINED BY PROJECT LEADERS)

SOFIT observations will occur during the following measurement periods (dates):
_____ until _____.

2.1. Scheduling visits during each measurement period

- Each school will be visited ___ times per measurement period.
- During each visit, ___ PE classes will be observed (i.e., total of _____ lessons/school/measurement period).
- Consecutive visits to the same school/class should occur at least ___ weeks apart (in order to be representative, including seasonality). Go on different days.
- Preferably measure on days considered as 'normal.'
- Distribute SOFIT measures across a **wide** and entire measurement window (for program generalizability)
- Project coordinator will call the school 24-48 hours prior to a scheduled visit to verify that PE classes will be held as scheduled. If PE classes are not held, observers will reschedule the visit as soon as possible.
- A missed visit to a school (e.g., storm day) should be rescheduled as soon as possible.
- Lessons observed for less than 16 minutes (secondary level) will not be entered for analyses, and the observation must be rescheduled).

3. PHYSICAL EDUCATION CLASS ELIGIBILITY

Physical education lessons that include students in grade(s) _____ will be assessed.

NOTE: SOFIT typically serves as lesson-level analysis. It can be used to assess individual levels of physical activity by focusing on one student throughout a lesson.

4. FACTORS IN SELECTING LESSONS FOR OBSERVATION

SOFIT variables (and any data collected in PE) are affected by a number of factors, including those in Table 1. Thus, for a true picture of the conduct of PE in schools it is important to sample periodically.

Table 1. Factors influencing SOFIT data.

Instructional goals ^a
-fitness, skill, knowledge, social/emotional development
Instructional content
-type of unit ^b
-lesson placement in unit ^c
Class characteristics
-size ^d
-diversity ^e
Environmental conditions
-size and location of instructional space ^f
-equipment and supplies ^g
-weather ^h

^a PE has many different goals; a single lesson might target a specific outcome and exclude others; outcomes change as teachers move through instructional units.

^b Activities (e.g., sports) promote different activity levels (e.g., soccer=high MVPA; softball, track and field, gymnastics which are often held in the spring=low MVPA).

^c Initial weeks of a unit typically have higher instruction and management time; the last weeks have more game play.

^d Larger classes are associated with less MVPA and more management time.

^e Having more objectives in a lesson are associated with increased instruction and management (transitions) time and reduced MVPA.

^f MVPA is reduced in smaller spaces, including indoor classes; because of inclement weather, outdoor lessons may be cancelled OR taken indoors impacting the MVPA of students already in indoor spaces.

^g More equipment and supplies are associated with increased student opportunities to respond and MVPA.

^h Very hot, humid, and cold weather inhibits MVPA.

To obtain valid measures activity levels, lesson context, and teacher behavior it is essential to select a representative sample of the PE lessons that students receive at a specific school. The lessons sampled should be representative of the school in terms of:

- grade level
- lesson content (during a visit and across measurement periods)
- days of the week in which PE is taught
- different teachers instructing PE

It is important, for example, that the lessons observed at a school not consist only of a single teacher instructing basketball on Mondays. To obtain a representative sample for a school/teacher, before observations are scheduled, the Measurement Coordinator should review the teaching schedules for all PE teachers, including grade levels and instructional units being taught (e.g., basketball, aerobic dance).

5. OBSERVER TRAINING, RELIABILITY, RECALIBRATION, AND REACTIVITY

1. During initial training, observers complete standardized classroom training, video analysis, field practice, and certification assessments. Retraining experienced observers and training of new ones will be conducted prior to each measurement period. The 93 minute *SOFIT Observer Training* DVD developed by Dr. McKenzie in 2009 and made available through Active Living Research in San Diego will be used for both training and assessing observers. It is recommended, however, that researchers working on large or very specialized projects create their own assessment tapes so that specific contextual events can be captured.
2. Accuracy will be assessed with periodic evaluations of pre-coded *gold-standard* video segments by observers. Summary statistics from the observer and the gold-standard videos will be compared.
3. During each measurement period, approximately ____% (e.g., 12%) of SOFIT lessons will be coded simultaneously by two independent observers. Only data from the designated “lead” observer for the lesson will be used for analysis. Percent agreement between scores from the “lead” and “reliability” observers will be computed on an interval by interval basis. A minimum of 80% agreement between scores is expected. The table in Section 9.7 in MOP explains how to compute reliability. Reliability should be computed in the field, or at least the same day, so that immediate feedback is available.
4. If a reliability score between observers is less than 80%, both the lead observer and the reliability observer should follow these steps until the reason for low agreement is resolved:
 - (a) close scrutiny of the protocols and review of definitions, followed by in-house discussions to identify possible areas of disagreement;
 - (b) review the SOFIT training video together, and
 - (c) complete live practice sessions with the lead observer.

If the reason(s) for disagreement are ones that should be shared with all the SOFIT measurement staff, then steps a-c should be done with the entire group.

5. Reliability below 80% does not preclude continuing SOFIT observations until the steps in item 4 above are completed, but discussions should immediately take place to assess why the reliability is low. If the difference is in overall reliability, try to determine which particular section is causing the disagreements, and focus discussions and retraining on that section. If reliability is a problem in many sections, refresher work should take place as soon as possible.

6. **Reducing Reactivity.** When visiting schools avoid indicating exactly which PE lessons you will be observing as long as possible. You are a visitor to class/school and are there to “see what students do during PE lessons.” Do not tell teachers which students you will observe or what the specific categories mean. Thank teachers for allowing you to visit. Avoid providing them (and others) feedback about the lesson, including the time and /percentages of occurrence for any category or how you perceived how the class went.

Look globally when observing. Do not stare directly at a target student or the teacher. You do, however, need to the student's activity level at the record signal. Avoid being distracted by unusual events. Be polite when asked by students and others about what you are doing in class. Respond in a businesslike manner such as, "I'm sorry, I'm in the middle of a task. I will try to answer your question at the end of class." If needed, pause your audio pacing device.

6. SOFIT TECHNICAL DESCRIPTION (ABBREVIATED)

SOFIT is conceptualized as a 3-phase decision system. Observers code student physical activity, lesson context, and teacher interaction/involvement in sequence during each 10-second record interval.

Phase 1. Student physical activity engagement.

The first phase of the decision sequence involves coding student physical activity levels. The engagement decision is made by observing a pre-selected student and determining his/her **level of physical activity** (i.e., active engagement level). The engagement level provides an estimate of the intensity of the student's physical activity. Codes 1 to 4 correspond to various body positions (i.e., lying down, sitting, standing, walking), and code 5 (vigorous) corresponds to energy expenditure beyond what is needed for ordinary walking. Higher codes indicate greater energy expenditure.

What is the physical nature of the student's engagement? What is his/her activity level?

Choices:

- (1) Lying down
- (2) Sitting
- (3) Standing
- (4) Walking
- (5) Vigorous

Phase 2. Lesson context/content.

The second phase of the decision sequence involves coding for the curricular **lesson context** (i.e., how is the lesson content being delivered). For each observation sample (a 10-second interval), a decision is made regarding whether lesson time is being allocated for general content (**M**) (such as management) or for actual PE unit content. If lesson content is occurring, an additional decision is made to determine whether the focus of the lesson is on knowledge (**K**) 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**), game play (**G**) or other (**O**).

The context of the lesson is determined by how time is being allocated for the class as a whole (at least 51% of the students)?

Choices:	<u>General content</u> (M) transition management break	<u>Knowledge content</u> (K) physical fitness general knowledge rules, strategy social behavior technique	Motor content <u>fitness</u> (F) <u>skill practice</u> (S) <u>game play</u> (G) <u>other</u> (O)
----------	--	---	--

Phase 3. Teacher behavior.

Two options are available, and their selection depends upon the objectives of the study. Teacher Interaction (3A) is used when assessors are mainly interested in teacher behavior that is related primarily to physical activity and physical fitness promotion. The original categories (1991) for Teacher Involvement (in 3B below) are used when the research interest is related more to general teacher behavior.

Phase 3A. Teacher interaction. (Physical Activity Promotion)

The third phase of the decision sequence involves coding the teacher's interactions during the interval regarding the promotion of physical activity, motor skills, or fitness. **Interactions** are classified as (**I**) when in-class physical activity or fitness is promoted, (**O**) when out-of-class physical activity or fitness is promoted, and (**N**) when neither in- nor out-of-class physical activity or fitness is promoted.

Did the teacher promote physical activity, fitness, or motor skills during the interval?

Choices: Promotes in-class physical activity, fitness, or motor skills (**I**)
Promotes out-of-class physical activity, fitness, or motor skills (**O**)
No, does not promote in- or out-of-class physical activity, fitness, or motor skills (**N**)

Phase 3B. Teacher involvement. (General: The Original Teacher Behavior Categories)

What is the teacher doing?

Choices: (**P**). promotes fitness (prompts, encourages, praises, etc.)
(**D**). demonstrates fitness (models)
(**I**). instructs generally
(**M**). manages
(**O**). observes
(**T**). other-task

7. SOFIT METHODOLOGY

Data collection: Pre-recorded verbal prompts on CDs, MP3s, or audiotapes keep observers on pace throughout a lesson via alternating 10-second observe/record prompts. During each record interval the observer enters a code for each of the three phases of decision sequence.

Observation technique: Code **Student Activity** and **Lesson Context** for events that are occurring at the “record” prompt to end the observation interval. Enter the **Interaction** code based teacher promotion of physical activity or fitness during the entire 10-second observation interval.

Interval length: Alternately “observe” and “record” during 10-second intervals. This yields 3 observations per minute and 90 observations per half-hour. Note: Observe for student level of activity, lesson context, and instructor interaction during the “observe” interval and record the results during the “record” interval (i.e., one line on the data recording form).

Selection of students: Select five target students for each lesson. Observe Student One for 4 minutes, and then rotate your focus on the four students for four minutes each until the lesson ends. Use the fifth student as a back-up. See section 9.3 for more details. Begin the observation period when the teacher and 51% of the class has reached the instructional station and continue until half the class has departed from the area. A 32-minute lesson would yield 96 observation intervals (24 samples with 4 different students each).

Data Yield: Data may be summarized by time (3 intervals = 1 minute), percent of intervals or lesson time, or estimated energy expenditure. Comparisons may be made among different categories, from class to class over time, or to established standards.

8. SOFIT DEFINITIONS AND CODING CONVENTIONS

8.1. Student activity levels

Code the activity level/ body position of a target student into one of the five following categories using momentary time sampling (i.e., code a number to indicate what the student is doing at the “record” prompt):

1. lying
2. sitting
3. standing
4. walking
5. vigorous

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

Code level 5 (vigorous) if the activity the student is doing at that moment requires expending more energy than he/she would during ordinary walking (do not consider body position only). For example, code 5 (vigorous) when the student is running, jogging, skipping, hopping, wrestling with a peer (even though lying on her back), and pedaling on a moving or stationary bike (even though sitting).

When the student is in transition from one category to another, enter the code for the higher category. For example, code level 2 (sitting) if at the record signal the student is partially lying down and partially sitting up; code level 3 (standing) when the student is kneeling.

8.2. Lesson context

Lesson Context refers to how physical education subject matter is delivered. Code the lesson context to indicate the primary delivery system operating using momentary time sampling (i.e., code **M**, **K**, **F**, **S**, **G**, or **O** at the “record” prompt).

General Content (M) Refers to lesson time when students are not intended to be involved in physical education content, including transition, management, and break times. Transition includes 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 includes 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 includes 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.

Knowledge Content (K) Refers to lesson time when the primary focus is on student acquisition of knowledge related to physical education, not activity engagement. Knowledge is typically related to: (a) Physical activity and fitness (i.e., information related to physical activity or physical fitness concepts, including endurance, strength, and flexibility), and (b) General Knowledge (information related to areas other than physical activity and fitness, such as history, technique, strategy, rules, and social behavior).

PE Motor Content Refers to lesson time when the primary focus is on student motor engagement (i.e., physical activity). Categories include fitness (**F**), skill practice (**S**), game play (**G**), and other/free play (**O**).

Fitness (F). Time allocated 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. Code relays conducted with more than three per team as games (G), not fitness.

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

Game play (G). Activity time devoted to the application of skills in a game or competitive setting. Game participants generally perform without major intervention from the instructor, such as during volleyball and tag games, balance beam routines, and folk dance performances.

Free play (O). Refers to free play time during which physical education instruction is not intended. This time resembles recess during which students may select to participate or not.

NOTES: Transition time that occurs naturally 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). Enter a new code is when the game or transition is halted for more than 10 seconds (usually for M or K).

8.3. Select 8.3A or 8.3B

8.3A. Teacher interactions (related to physical activity & fitness promotion)

Code the appropriate letter (**I O N**) to indicate whether or not during the observe interval the teacher provides specific verbal or nonverbal interactions to promote students to engage in physical activity, motor skills, or fitness. **Interactions** are classified into one of three categories. Score (**I**) when the instructor promotes in-class physical activity, motor skills, or fitness; and score (**O**) when the instructor promotes out-of-class physical activity, motor skills, or fitness. Score (**N**) when the instructor does not promote either in- or out-of- class physical activity or fitness.

Use partial interval recording (i.e., record promoting if it occurs at any time during the 10-second observation interval). The interaction can be directed to any student in class, not just the target student.

Promotes in-class MVPA (physical activity/fitness/motor skills) (I). Promotes in-class physical activity/fitness or motor skill engagement by prompting or encouraging physical or fitness activity during the interval. For example, (a) attempts to initiate or increase student engagement in a physical or fitness activity; or (b) praises or reinforces physical/fitness activity (e.g., makes a statement or gesture during or following a student activity engagement clearly designed to increase or maintain such responses in the future). Code “**I**” for prompting and praising students during fitness testing; simply entering fitness data or providing a score would be coded “**N**.”

Promotes out-of-class MVPA (physical activity/fitness/motor skills) (O). Promotes out-of-class MVPA (including physical activity/fitness and motor skills engagement) beyond the PE lesson. For example, (a) attempts to initiate or increase student engagement in fitness, physical activity, or motor skills outside of PE class; or (b) praises or reinforces these behaviors for occurring beyond class (e.g., at school, home, or in the community).

No promotion (N). Code “**N**” as default when neither in-class (**I**) or out-of-class (**O**) physical activity/fitness were promoted by the instructor during the interval.

NOTES: While unlikely, it is possible to record both **I** and **O** for the same interval. Code **N** only if no promotion occurs in the interval.

During lessons that are team-taught, record the interactions of the instructor who is responsible for the target student. This instructor could change periodically during the lesson.

I. In-class examples

- a) Initiates or increases student activity engagement
 - “10 push ups, begin”
 - “swing through faster on your forehand”
 - “go, go, hustle”

- b) Praises or reinforces
 - “nicely done on that move”
 - “that’s the way to hustle into position”
 - “That’s a super follow-through”
 - “You’re trying really hard, I like that effort!”
 - “Forty-three! Wow, that’s awesome number of sit-ups!”

O. Out-of-class examples

- a) Initiates or increases student activity engagement
 - “Remember to practice that move 10 times at home before tomorrow’s class.”
 - “Don’t forget to sign up for intramural soccer at noon time.”
 - Remember, on Tuesday we are going to see how many can get to school without using a motor.”
- b) Praises or reinforces
 - “Pat, it was nice to see you out running before school today.”
 - ”I’m glad to see 16 of you signed up for the dance club that meets after school”

N. No Promotion is the default code.

-Use when I and O are not scored.

Abbreviated Coding Sheet (3A)

Interval	Student Activity	Lesson Context	Teacher Interactions
1	1 2 3 4 5	M K F S G O	I O N
2	1 2 3 4 5	M K F S G O	I O N

8.3B. Teacher Involvement (General Categories)

This is an alternative method for assessing general teacher involvement during lessons (8.3A assesses teacher behavior related specifically to physical activity promotion).

Circle the appropriate letter (**P D I M O T**) to indicate what the teacher did during the observation interval. Use partial interval recording according to the following **hierarchy**:

Promotes fitness (P). Promotes fitness by prompting or encouraging fitness related activity. For example, (a) attempts to initiate or increase student engagement in a fitness activity or enhance students' perception of their ability to do a fitness task); and (b) praises or reinforces fitness activity (e.g., makes a statement or gesture during or following a student fitness activity engagement clearly designed to increase or maintain such responses in the future). Includes actual engagement in prompting and praising students during fitness testing. Code the recording of fitness data, however, as "management."

Demonstrates fitness (D). Models fitness engagement (e.g., demonstrates how to do a fitness task or participates with students in a fitness activity).

Instructs generally (I). Lectures, describes, prompts, or provides feedback to students related to all physical education content (e.g., topography, skill development, technique, strategy, rules) except physical fitness engagement. Both positive and corrective feedback for skill attempts are coded as instructs generally. Code this category is when the teacher models physical skills or lectures about physiological responses without actually promoting fitness engagement.

Manages (M). Manages students or the environment by engaging in non-subject matter tasks (e.g., sets up equipment, takes roll, collects papers, directs students to do management tasks).

Observes (O). Monitors entire class, group, or an individual. To be recorded, the teacher must observe throughout the entire 10-second interval and not be engaged in any other coding category.

Other task (T). Attends to events not related to his/her responsibilities to the class at hand. For example, reads the newspaper, turns back on class, leaves the instructional area to meet with school personnel or make phone calls. To be recorded, the teacher must be on other-task for entire 10-second interval.

NOTES:

Teacher behavior/involvement categories are listed in hierarchical order. Code only one category for each 10-second observe interval. For example, category one (promotes fitness) is scored if it occurs at any time during the interval; category two is scored if it occurs during an interval unless a category one behavior occurs.

Researchers interested in obtaining a measure of negative reinforcement or punishment are directed to score prompts that are sarcastic or punitive in nature by drawing a line through the P, rather than circling it.

Abbreviated Coding Sheet (3B)

Interval	Student Activity	Lesson Context	Teacher Involvement
1	1 2 3 4 5	M K F S G O	P D I M O T
2	1 2 3 4 5	M K F S G O	P D I M O T

9. DIRECTIONS FOR SOFIT OBSERVERS

9.1. Warm-up

Arrive at the instructional site and be prepared to collect data at least ten minutes before the announced start time of the lesson. Warm-up by mentally rehearsing or actively practicing the coding conventions.

9.2. Equipment

The following supplies are needed for SOFIT observation (unless digital recorders are used)

- pencils, a clipboard, ample SOFIT observation sheets,
- portable audio player, ear jack, fresh batteries
- pre-recorded SOFIT pacing audio to pace the observations,
- hip pack/arm band to hold the audio player so observers' hands are free

NOTE: It is wise to have an additional audio player available for emergencies.

9.3. Select target students

Select five students who are representative of the class as possible targets for observation. Do not select students who are sitting out. As students arrive at the instructional station, select students 4, 8, 12, 16, and 20 in classes with fewer than 25 students, and select numbers 5, 10, 15, 20, and 25 in classes with more than 25 students. Note some identifying characteristics of the students on the SOFIT Lesson Observation Form to enable you to locate them later.

Observe each student for 4 consecutive minutes before changing your focus to the next student. Reserve the fifth student as a backup replacement in case one of the first four leaves the observation environment. If you are observing the replacement student and the original student comes back to class, continue observing the replacement student for that rotation. A rotation is a four minute interval of observation. Go back to the original student during the next rotation.

Prior to the lesson starting, it may be difficult to determine which students are in a class if more than one class shares the instructional space. Hopefully, once the teachers are present, the classes will disperse into more definable groups of students. However, if observation has begun and it turns out that a student being observed is in a different class, change immediately to a representative of the target class.

Students often look similar because they wear uniforms. The protocol states that the 5th, 10th, 15th, etc. student is to be selected, but observers may be tempted to pick students who are more readily identifiable (e.g., those with an unusual hairstyle or polka dot socks). Avoid doing so, because the goal of observing a representative sample would be compromised.

If you cannot locate the student originally selected, observe a similar looking student instead. Use caution to not introduce bias (e.g., selecting an active person because you are attracted to motion).

9.4. Observation procedures

1. The target student is the major focus of the observation, however, place yourself in a position so that you can also hear the teacher and 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. Do not begin observations until the teacher is present.
3. Start the audio player and begin observing when 51% of the students reach the instructional station (gymnasium or designated outdoor space) and the teacher is present. Write the start time on the first cover page.
4. Data should be representative of the entire class period. Even in emergency situations (e.g., can't find the class), do not begin observations if the lesson has been underway for over five minutes.
5. Observe the student activity, lesson context, and interaction/involvement throughout the 10-second "**observe**" interval. Enter codes by filling in the appropriate symbols during the 10-second "**record**" interval.
5. Code Student One for four consecutive minutes (12 observations). Then code Students Two, Three, and Four in sequence. Continue in this manner, rotating the focus on a different target student every four minutes until the lesson ends.
6. End observing when 51% of the students have departed the instructional area. Record end time on the cover page.
7. Cue the audio for the next lesson.

9.5. Summarize Data

1. Calculate and record the lesson length on page one of the SOFIT observation booklet.
2. Tabulate (sum vertically) and record the total for each of the 14 coding categories at the bottom of each page in the booklet.
3. Copy the summary scores from each page to the SOFIT Summary Form (see Appendix B).
4. Calculate the total (across all pages) and record under TOTAL.
5. Complete the header information of the SOFIT Summary Form.
6. Attach forms in the following order: 1) SOFIT Summary Form; 2) SOFIT Lesson Observation Booklet; and 3) any reliability materials.

9.6. Reliability checks

1. Approximately 12% of all SOFIT lessons should be coded simultaneously by two independent observers. All observers should complete reliability checks. Reliabilities should be conducted at different schools.
2. To the extent possible, reliabilities should take place:
 - a.) at least once per school
 - b.) more frequently early in the study rather than later (the rationale being if the reliability is poor, we want to know about it earlier rather than later)
3. When doing reliability checks, use a single audio player/tape recorder to pace both observers. Insert a y-adaptor into the audio-out and attach the two ear jacks to it.
4. One person will be designated the Lead Observer and his/her data will be used for analysis. The other person will be the Reliability Observer and will indicate this on the cover page of the SOFIT Booklet.
5. It is very important that the Lead Observer and the Reliability Observer begin observing AT THE SAME TIME and that they record the same information on the front page of the SOFIT form for all entries except REL OBS. The Lead Observer will check 'NO' for REL OBS and the Reliability Observer will check 'YES.'
6. It is acceptable for reliability and lead observers to talk to each other when changing students (i.e., at the end of each 4 minute interval) to ensure that they select the same student to observe.

9.7. Calculating reliabilities

Calculate percentage agreement for the three major categories on an interval-by-interval basis using the standard formula (agreements/observed intervals multiplied by 100) using the following steps:

- a) Match the lead observer's recordings to the reliability observer's booklet.
- b) On the reliability observer's form, mark a red square to indicate instances of disagreement for student activity, lesson context, or teacher interaction.
- c) Total the number of disagreements (red squares) for student activity, lesson context, or teacher interaction and write the number at the bottom of the each page, and then across all pages.
- d) Complete a table similar to the following (for a 40 min lesson or 120 intervals):

	INTERVALS	AGREEMENTS	DIAGREEMENTS	% AGREEMENT
Student Activity	120	113	7	94.1%
Lesson Context	120	108	12	90.0%
Teacher Interaction	120	102	18	85.0%

e) Calculate the reliabilities (percent agreement) using the formula:

$$\text{Percent Agree} = (\text{Total \# Agree})/(\text{Total \# Obs}) \times 100$$

f) Attach results to the Reliability observer's booklet.

Note: When reliabilities fall lower than 80%, do refresher work using videotapes. In the absence of a refresher tape, assessors need to practice, preferably in pairs or groups while discussing agreements until consensus is reached. Note that it is unrealistic to expect high agreements without practice in diverse environments. See Section 5 for more details.

9.8 Documenting Unusual Events

Document unusual events (e.g., fire drills) that occur during a lesson to help explain the data.

10. COMPLETING THE SOFIT OBSERVATION FORM

10.1. ID labels

An ID system needs to be generated to keep track of forms and information. Consider having a district, school, and teacher ID.

How will forms be collected, sorted, stored, entered, and analyzed? Who will do each task?

10.2. Data management

Teacher Name: Record the teacher's name on the space provided. If he/she is not a regular PE specialist at the school, indicate if she is a substitute teacher or classroom teacher.

Observer ID: Each certified SOFIT observer is to be assigned a unique observer ID number.

Teacher gender: Indicate the gender of the instructor that primarily leads the class. **M**=male; **F**=female

Location: Specify the primary location of the lesson: **O**=outdoors; **I**=indoors.

Rel Obs: Code as **Yes** only if you are the designated reliability observer.

Series #: The series number is used along with the ID and Seq # (described below) to uniquely identify a form. The series number identifies a new data collection visit. During the baseline measurement period, Series=01, 02, and 03 will be used to identify the first, second and third visits to the school, respectively.

Date: Enter numbers for Month (**MM**), Day (**DD**), and Year (**YYYY**)

Period: Enter the class period being observed at the school that day.

Grade: Enter the school grade of the class (enter median grade for combination classes).

Start Time: Enter time the lesson actually started (Use 24-hr clock; e.g., 13:30 is 1:30PM).

End Time: Enter time the lesson actually ended (Use 24-hr clock; e.g., 13:30 is 1:30PM).

No. girls/boys: At minute 16 (at the end of page 1) enter the total number of girls and boys participating in the lesson (students need not be physically active at that time). Do not include those enrolled in the class, but absent (e.g., in library or at home).

Listed above

Student activity: Identify the activity level of observed student at the "record" signal: **1**=lying down; **2**=sitting; **3**=standing; **4**=walking; **5**=vigorous.

Lesson context: Identify the lesson context occurring at the "record" signal: **M**=management; **K**= knowledge; **F**=fitness activity; **S**=skill drills; **G**=game play; **O**=Other (e.g., free play).

Interactions: Identify teacher verbal or nonverbal interactions to promote physical activity and fitness during the "observe" interval. **I**=in class; **O**=out of class; **N**=none.)

Comments: Write notes to describe the target student, lesson activities, or unusual events.

SOFIT RECORDING FORM

Date _____ School _____ Grade ___/Period ___ Teacher _____ Teacher Gen: M F SERIES _____
 Time start _____ Observer _____ Rel obs _____ No girls _____ boys _____ Location: O I
 Time end _____ Lesson Length _____ No of obs. _____ Page 1 2 3 4 of _____

		Student Activity	Lesson Context	Interactions	NOTES
	1	1 2 3 4 5	M K F S G O	I O N	
	2	1 2 3 4 5	M K F S G O	I O N	
	3	1 2 3 4 5	M K F S G O	I O N	
o n e	4	1 2 3 4 5	M K F S G O	I O N	
	5	1 2 3 4 5	M K F S G O	I O N	
	6	1 2 3 4 5	M K F S G O	I O N	
m/f	7	1 2 3 4 5	M K F S G O	I O N	
	8	1 2 3 4 5	M K F S G O	I O N	
	9	1 2 3 4 5	M K F S G O	I O N	
	10	1 2 3 4 5	M K F S G O	I O N	
	11	1 2 3 4 5	M K F S G O	I O N	
	12	1 2 3 4 5	M K F S G O	I O N	
<hr/>					
	13	1 2 3 4 5	M K F S G O	I O N	
	14	1 2 3 4 5	M K F S G O	I O N	
t w o	15	1 2 3 4 5	M K F S G O	I O N	
	16	1 2 3 4 5	M K F S G O	I O N	
	17	1 2 3 4 5	M K F S G O	I O N	
m/f	18	1 2 3 4 5	M K F S G O	I O N	
	19	1 2 3 4 5	M K F S G O	I O N	
	20	1 2 3 4 5	M K F S G O	I O N	
	21	1 2 3 4 5	M K F S G O	I O N	
	22	1 2 3 4 5	M K F S G O	I O N	
	23	1 2 3 4 5	M K F S G O	I O N	
	24	1 2 3 4 5	M K F S G O	I O N	
<hr/>					
	25	1 2 3 4 5	M K F S G O	I O N	
	26	1 2 3 4 5	M K F S G O	I O N	
t h r e e	27	1 2 3 4 5	M K F S G O	I O N	
	28	1 2 3 4 5	M K F S G O	I O N	
	29	1 2 3 4 5	M K F S G O	I O N	
m/f	30	1 2 3 4 5	M K F S G O	I O N	
	31	1 2 3 4 5	M K F S G O	I O N	
	32	1 2 3 4 5	M K F S G O	I O N	
	33	1 2 3 4 5	M K F S G O	I O N	
	34	1 2 3 4 5	M K F S G O	I O N	
	35	1 2 3 4 5	M K F S G O	I O N	
	36	1 2 3 4 5	M K F S G O	I O N	
<hr/>					
	37	1 2 3 4 5	M K F S G O	I O N	
	38	1 2 3 4 5	M K F S G O	I O N	
f o u r	39	1 2 3 4 5	M K F S G O	I O N	
	40	1 2 3 4 5	M K F S G O	I O N	
	41	1 2 3 4 5	M K F S G O	I O N	
m/f	42	1 2 3 4 5	M K F S G O	I O N	
	43	1 2 3 4 5	M K F S G O	I O N	
	44	1 2 3 4 5	M K F S G O	I O N	
	45	1 2 3 4 5	M K F S G O	I O N	
	46	1 2 3 4 5	M K F S G O	I O N	
	47	1 2 3 4 5	M K F S G O	I O N	
	48	1 2 3 4 5	M K F S G O	I O N	
<hr/>					
SUM					

SOFIT SUMMARY FORM

School _____

Teacher name _____

Observer ID _____ Date _____ Grade ____ Lesson length _____ min

Total observed intervals _____

	PAGE					TOTAL
	1	2	3	4	5	
Student activity						
1. lying down						
2. sitting						
3. standing						
4. walking						
5. vigorous						
Lesson context						
Management (M)						
Knowledge (K)						
Fitness activity (F)						
Skill practice (S)						
Game play (G)						
Other (O)						
Interactions						
Promotes in class PA/fitness (I)						
Promotes out-of-class PA/fitness (O)						
No PA/fitness promotion (N)						

SPECIAL NOTES:

SOFIT CODING CONVENTIONS

1. Q: Most of the class is standing in line during fitness testing that is being done with one or two students at a time. Is this fitness or management?
A: Fitness.
2. Q: How are cooperative activities coded (e.g., some activities that don't seem to easily fall into skill, fitness, or game)?
A: Cooperation goals can be reached within any of the six contexts. For example, when students are being informed about the importance of cooperation, code "K"; when they are forming cooperative groups, code "M"; when they are practicing a skill cooperatively, code "S"; and when they are playing a cooperative game, code "G."
3. Q: Classes reshuffle after the lesson starts (e.g., teachers split up classes). Do I (a) stick with the students selected and try to observe them across different teachers, or (b) remain with the teacher whose class I was observing and select new students in that group to replace ones who left?
A: Do (b), stick with the class you are observing and select new students.
4. Q: Similar to #3, If multiple classes group together for a choice of activities, do I try to stick with the students originally selected, or do I locate students within the area supervised by the teacher whose class I was scheduled to observe?
A: Try to stick with the class you are observing and select new students. Also, assess for interactions by the lead teacher in the setting you are observing. See section 8.3.
5. Q: During lessons with running (e.g., cross country) it may be difficult to locate the next student to observe because she may be in a different part of a large area than the previous target student. If I can't find the next pre-selected student (or the alternate) in a timely manner, should I select another student from the crowd to not miss numerous lesson intervals hunting for the particular student?
A: Try not to lose intervals or class time. Without using some systematic bias, select a replacement student similar in appearance to your initial target student.
6. Q: Related to #5. A school may do 'campus runs' or cross country skiing where students circle the campus (a group of buildings, trees). If I stay in one area, I will lose sight of my student for extended periods. If I jogs along with the target student, I will end the 4-minute interval where students around me are moving at about the same pace, but may not be representative of the class as a whole. Finding the next pre-selected student would be very difficult. How do I handle the selection?
A: Locate/relocate to the position that gives the clearest view of the target students. If the "next" target student is not available in that setting, select a back-up student as a replacement.
7. Q. What modifications to activity levels are made for swimming pools?
A: All activity codes remain the same except for Level 4, walking. In addition to walking, code level 4 when the target student is floating or swimming slowly (i.e., when energy expenditure is similar to that of a walk).
8. Q. What modifications are made for students translocating using wheels (e.g., tricycles, bicycles, rollerblades, wheel chairs)?
A: All activity codes remain the same except for Level 4, walking. In addition to walking, code Level 4 when the person is self-propelling using wheels in a slow motion. Code Level 5, vigorous, when the energy required for self-propulsion is greater than an ordinary walk.

OCCASIONALLY ASKED QUESTIONS

1. Q: What should I say to students who want to know what I am doing in their class?
A: The response should be "I'm sorry, I can't talk now." If needed, a further response could be "We're interested in learning what goes on in physical education classes in schools."
Pause the audio if the disruption requires more than 10 seconds.
2. Q: When there are 2 teachers in a room because classes have been joined and the teacher of the OTHER class encourages the student we are watching, does that count as encouragement in class for teacher interaction?
A: Yes, code for the teacher that is in charge of the target student.
3. Q: I watched a lesson in which a substitute lost control of the class. Although it was her original intent that students play basketball GAMES, they were clearly doing SKILL DRILLS INSTEAD. What would the lesson context be?
A: The lesson context is what they were actually doing. In this case, code skill drills (s).

Protocol for the PE Observation Form (PEOF)

PURPOSE

PEOF is used to assess physical education lessons for the occurrence of key lesson components and for instructional behaviors that are associated with the potential for students developing approach tendencies for physical activity engagement.

PROCEDURE

The PE Observation Form will be completed by trained assessors immediately after observing an entire lesson using SOFIT.

1. **Warm-up.** Warming-up before engaging in vigorous or explosive movements is important in reducing injuries. Score 'Yes' for warm-up if at least a 2-minute preparation period was allocated to students before they were required to do vigorous movements during the lesson. Methods of warming-up could include:
 1. Walking while moving arms slowly
 2. Doing slow paced running or aerobics
 3. Stretching
 4. Doing a game, drill, or activity at a low intensity.
2. **Cool-down.** Cooling-down after engaging in vigorous or explosive movements is important to allow the body to return to normal functioning levels and to increase flexibility. Score 'Yes' for cool-down if at least a 2-minute period was allocated during the lesson following vigorous movements. The cool-down typically occurs near the end of a lesson and could include:
 1. Walking while moving arms slowly
 2. Doing slow paced running or aerobics
 3. Stretching
 4. Reducing the intensity of a game, drill, or activity.
3. **Students were encouraged to be physically active.** Students received prompts or encouragement to be physically active (i.e., engage in high intensity activity or increase their physical activity levels) from the teacher during the lesson. Do not include instructional prompts for skill topography (i.e., skill form).
4. **Students received praise for their active participation.** Students received praise or positive feedback about their physical activity levels or activity engagement during the lesson from the teacher.
5. **Most students appeared to enjoy themselves.** Students laughed, smiled, and appeared happy while engaging in lesson activities.
6. **Students were given clear instructions.** Students understood and could follow management and instruction tasks.
7. **Lesson had adequate student:equipment ratio.** The provision of adequate amounts of equipment provided students with opportunities to be active and learn skills. Preferably, the student/equipment ratio should not exceed 3 to 1 during skill practice and 10 to 1 during game play.

8. **Group sizes were appropriate to activity.** Appropriate sized groups permitted ample opportunities for students to be active and learn skills. Group sizes may be inappropriate if students are waiting in line for extended periods.
9. **Students were prompted/rewarded for out-of class MVPA engagement.** Students received prompts, rewards, or praise from the teacher about engaging in physical activity during non-PE class time (e.g., before, during, or after school and on weekends). Prompted events could be any physical activities, including individual events, team sports, and family engagement.
10. **Teacher showed enthusiasm for teaching.**

PEOF Rating Scale

None of the time: The characteristic was not present at all in the observed lesson

Some of the time: The characteristic occurred at least once during the observed lesson and may have occurred sporadically, infrequently, or affected only a minority of lesson time.

Most of the time: The characteristic occurred frequently and regularly throughout the lesson. In the case of items that measure more continual characteristics (e.g., group size), the characteristic was present for a majority of class time, between 50-80% of activity time.

All of the time: The characteristic was consistent and ongoing throughout the entire lesson. In the case of items that measure more continual characteristics (e.g., equipment:student ratio), the characteristic was present for virtually the entire class time.

SOFIT DATA TRACKING FORM

FROM: _____ DATE: _____

ADDRESS: _____

PHONE: _____ FAX: _____

E-MAIL: _____

Attached are PEOF and SOFIT DATA FORMS for the following PE Observations:

District (E.G.,) #1 ISD	School	Date	Grade	Classroom/PE teacher	#SOFIT sheets
	Obama	10.02.09	4	Jones-4A/Clinton	2
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

PLEASE ADD COMMENTS BELOW AND ON THE REVERSE SIDE. THANKS!

SOFIT References (Selected)

GENERAL:

McKenzie, T. L. (2002). The use of direct observation to assess physical activity. In G. Welk (Ed.), *Physical activity assessments for health-related research* (pp. 179-195). Champaign, IL: Human Kinetics.

SOFIT Methods & Measurement papers:

- McKenzie, T. L., Sallis, & Nader, P. R. (1991). SOFIT: System for observing fitness instruction time. *Journal of Teaching in Physical Education, 11*, 195-205. **(The ORIGINAL paper)**
- Heath, E. M., Coleman, K. J., Lensegrav, T., & Fallon, J. A. (2006). Using momentary time sampling to estimate minutes of physical activity in physical education: Validation of scores for the system for observing fitness instruction time. *Research Quarterly for Exercise and Sport, 77*, 142-146. (compares time sampling with duration recording; demonstrates viability of MTS)
- Honas, J. J., Washburn, R. A., Smith, B. K., Greene, J. L., Cook-Wiens, G., & Donnelly, J. E. (2008). The System of Observing Fitness Instruction Time (SOFIT) as a measure of energy expenditure during classroom-based physical activity. *Pediatric Exercise Science, 20*(4), 439-445.
- Keating, X. D., Kulinna, P. H., & Silverman, S. (1999). Measuring teaching behaviors, lesson context, and physical activity in school physical education programs: Comparing the SOFIT and C-SOFIT instruments. *Measurement in Physical Education and Exercise Science, 3*, 207-220. (computerized version of SOFIT)
- McClain, J. J., Abraham, T. L., Brusseau, T. A., & Tudor-Locke, C. (2008). Epoch length and accelerometer outputs in children: Comparison to direct observation. *Medicine & Science in Sport and Exercise, 40*, 2080-2087.
- McKenzie, T. L., Strikmiller, P. K., Stone, E. J., Woods, S. E., Ehlinger, S., Romero, K. A., & Budman, S. T. (1994). CATCH: Physical activity process evaluation in a multicenter trial. *Health Education Quarterly, Supplement 2*: S73-S89.
- McNamee, J., & van der Mars, H. (2005). Accuracy of momentary time sampling: A comparison of varying interval lengths using SOFIT. *Journal of Teaching in Physical Education, 24*, 282-292.
- Pope, R. P., Coleman, K. J., Gonzalez, Barron, F., & Heath, E.M. (2000). Validity of a Revised System for Observing Fitness Instruction Time (SOFIT). *Pediatric Exercise Science, 14*, 135-147.
- Rowe, P.J., Schuldheisz, J.M., & van der Mars, H. (1997). Measuring physical activity in physical education: Validation of the SOFIT direct observation instrument for use with first to eighth grade students. *Pediatric Exercise Science, 9*(2), 136-149.
- Rowe, P.J., van der Mars, H., Schuldheisz, J.M, & Fox, S. (2004). Measuring students' physical activity levels: Validating SOFIT for use with high school students. *Journal of Teaching in Physical Education, 23*, 235-251.
- Scruggs, P. W. (2007). A comparative analysis of pedometry in measuring physical activity of children. *Medicine & Science in Sport and Exercise, 39*, 1837-1846.
- Scruggs, P. W. (2007). Middle school physical education physical activity quantification: A pedometer steps/min guideline. *Research Quarterly for Exercise and Sport, 78*, 284-293.
- Scruggs, P. W. (2007). Quantifying activity time via pedometry in fifth- and sixth-grade physical education. *Journal of Physical Activity & Health, 4*, 215-227.
- Scruggs, P.W., Beveridge, S. K. & Clocksin, B. D. (2005). Tri-axial accelerometry and hear rate telemetry: Relation and agreement with behavioral observation in elementary physical education. *Measurement in Physical Education and Exercise Science, 9*, 203-218.
- Scruggs, P.W., Beveridge, S. K., Eisenman, P.A., Watson, D. L., Schultz, B.B., & Ransdell, L. B. (2003). Quantifying physical activity via pedometry in elementary physical education. *Medicine & Science in Sport and Exercise, 35*, 1065-1071.
- Scruggs, P.W., Beveridge, S. K., Watson, D. L. & Clocksin, B. D. (2005). Quantifying physical activity in first-through fourth-grade physical education via pedometry. *Research Quarterly for Exercise and Sport, 76*, 166-175.

Other SOFIT papers (includes adaptations and descriptive and intervention studies)

- Cardon, G., Verstraete, S., De Clercq, D., & De Bourdeaudhui, I. (2004). Physical activity levels in elementary school physical education: A comparison of swimming and nonswimming classes. *Journal of Teaching in Physical Education, 23*, 252-263.
- Chow, B., McKenzie, T. L., & Louie, L. (2008). Children's physical activity and environmental influences during elementary school physical education. *Journal of Teaching in Physical Education, 27*, 38-50.
- Chow, B., McKenzie, T. L., & Louie, L. (2009). Physical activity and environmental influences during secondary school physical education. *Journal of Teaching in Physical Education, 28*, 21-37.

- Coe, D., Pivarnik, J., Womack, C., Reeves, M., & Malina, R. M. (2006). Effect of physical education and activity levels on academic achievement in children. *Medicine & Science in Sport & Exercise*, 38, 1515-1519.
- Coleman, K. J., Geller, K. & Rosenkranz, R. (2008). Physical activity and healthy eating in the after-school environment. *Journal of School Health*, 78(12), 633-640.
- Curtner-Smith, M. D., Sofo, S., Chouinard, J., & Wallace, S. (2007). Health-promoting physical activity and extra-curricular sport. *European Physical Education Review*, 13(2), 131-144.
- DuBose, K., Mayo, M., et al. (2008). Physical activity across the curriculum (PAAC): Rationale and design. *Contemporary Clinical Trials*, 29(1), 83-93.
- Fairclough, S. J., & Stratton, G. (2005). Improving health-enhancing physical activity in girls' physical education. *Health Education Research*, 20(4), 448-457.
- Fairclough, S. J., & Stratton, G. (2006). Effects of a physical education intervention to improve student activity levels. *Physical Education and Sport Pedagogy*, 11(1), 29-44.
- Faucette, N., McKenzie, T. L., & Sallis, J. (1992). Self-contained versus team teaching: An analysis of a physical education intervention by classroom teachers. *Journal of Teaching in Physical Education*, 11, 268-287.
- Faison-Hodge, J. & Porretta, D. L. (2004). Physical activity levels of students with retardation and students without disabilities. *Adapted Physical Activity Quarterly*, 21, 139-152.
- Heath, E. M., Coleman, K. J., (2002). Evaluation of the institutionalization of the coordinated approach to child health (CATCH) in a US/Mexico border community. *Health Education Behavior*, 29, 444-460.
- Jennings-Aburto, N., Nava, F., Bonvecchio, A., Safdie, M., González-Casanova, I., Gust, T., & Rivera, J. (2009). Physical activity during the school day in primary schools in Mexico City. *Salud Pública de México*, 51(2), 141-147.
- Kelder, S., Hoelscher, D. M., Barroso, C., Walker, J., Cribb, P., & Hu, S. (2005) The CATCH Kids Club: A pilot after school study for improving elementary student's nutrition and physical activity. *Public Health Nutrition*, 8, 133-140.
- Levin, S., McKenzie, T. L., Hussey, J. R., Kelder, S., & Lytle, L. (2001). Variability of physical activity in physical education lessons across elementary school grades. *Measurement in Physical Education and Exercise Science*, 5(4), 207-218.
- Lieberman, L. J., Dunn, J. M., van-der-Mars, H., McCubbin, J. (2000). Peer tutors' effects on activity levels of deaf students in inclusive elementary physical education. *Adapted Physical Activity Quarterly*, 17, 20-39.
- McKenzie, T. L., Feldman, H., Woods, S. E., Romero, K. A., Dahlstrom, V., Stone, E. J., Strikmiller, P. K., Williston, J. M., & Harsha, D. W. (1995). Student activity levels and lesson context during third grade physical education. *Research Quarterly for Exercise and Sport*, 66, 184-193.
- McKenzie, T. L., Catellier, D., Conway, T., Webber, L., Lytle, L., Elder, J., Pratt, C., & Greiser, M. (2006). Girls' physical activity levels and lesson context during middle school physical education: TAAG Baseline. *Medicine and Science in Sport and Exercise*, 38(7), 1229-1235.
- McKenzie, T. L., Li, D., Derby, C., Webber, L., Luepker, R. V., & Cribb, P. (2003). Maintenance of effects of the CATCH physical education program: Results from the CATCH:ON study. *Health Education & Behavior*, 30(4), 447-462.
- McKenzie, T. L., Marshall, S., Sallis, J. F. & Conway, T. L. (2000). Student activity levels, lesson context, and teacher behavior during middle school physical education. *Research Quarterly for Exercise and Sport*, 71, 249-259.
- McKenzie, T. L., Nader, P. R., Strikmiller, P. K., Yang, M., Stone, E. J., Taylor, W. C., Perry, C. L., Epping, J., Feldman, H., Luepker, R. V., & Kelder, S. H. (1996). School physical education: Effect of the Child and Adolescent Trial for Cardiovascular Health (CATCH). *Preventive Medicine*, 25, 423-431.
- McKenzie, T. L., Prochaska, J. J., Sallis, J. F., & LaMaster, K. (2004). Coeducational and single-sex physical education in middle schools: Impact on physical activity. *Research Quarterly for Exercise and Sport*, 75(4), 446-449.
- McKenzie, T. L., Sallis, J. F., Kolody, B., & Faucette, N. (1997). Long-term effects of a physical education curriculum and staff development program: SPARK. *Research Quarterly for Exercise and Sport*, 68, 280-291.
- McKenzie, T. L., Sallis, J. F., Prochaska, J. J., Conway, T. L., Marshall, S. J., & Rosengard, P. (2004). Evaluation of a 2-Year middle school physical education intervention: M-SPAN. *Medicine and Science in Sport and Exercise*, 36, 1382-1388.
- McKenzie, T. L., Stone, E. J., Feldman, H. A., Epping, J. N., Yang, M., Strikmiller, P. K., Lytle, L. A., & Parcel, G. S. (2001). Effects of the CATCH physical education intervention: Teacher type and lesson location. *American Journal of Preventive Medicine*, 21, 101-109.
- NICHD Study of Early Child Care and Youth Development Network. (2003). Frequency and intensity of activity of third grade children in physical education. *Archives of Pediatrics & Adolescent Medicine*, 157, 185-90.
- Parker, M. B. & Curtner, M. (2005). Health-related fitness in sport education and multi-activity teaching. *Journal of Physical Education and Sport Pedagogy*, 10, 1-18.
- Patterson, D. L., & Van der Mars, H. (2008). Distant interactions and their effects on children's physical activity levels. *Physical Education & Sport Pedagogy*, 13(3), 277-294.
- Sallis, J. F., McKenzie, T. L., Alcaraz, J. E., Kolody, B., Faucette, N., & Hovell, M. F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health*, 87, 1328-1334.
- Sit, C. H. P., McManus, A., McKenzie, T. L., & Lian, J. (2007). Physical activity levels of children in special schools. *Preventive Medicine*, 45, 424-431.
- Sit, C. H. P., McKenzie, T. L., Lian, J., & McManus, A. (2008). Activity Levels during physical education and recess in two special schools for children with mild intellectual disabilities. *Adapted Physical Activity Quarterly*, 25, 247-259.
- Verstraete, S., Cardon, G., DeClercq, D., & DeBourdeaudhuij, I. (2007). Effectiveness of two-year health-related physical education intervention in elementary schools. *Journal of Teaching in Physical Education*, 26, 20-34.

SOFIT PACING CUES

(Initial Verbal Cues for 4 subjects/48 intervals/16 minutes)

Auditory (verbal) prompts are needed to pace the alternating 10-second observe/record intervals so that observers can keep their hands free and focus directly on the lesson). We use MP3s or IPODS instead of tape players. A 48-minute pacing tape is sufficient for all but the longest classes. The following are the initial audio prompts for observing a student for four minutes. These can be repeated as needed. The voice on the tape speaks only the words inside the "quotes".

Start audio: **"locate subject one"**

ELAPSED MIN:SECONDS

0:00 "observe subject one"

0:10 "record interval one"

0:20 "observe"

0:30 "record 2"

0:40 "observe"

0:50 "record 3"

1:00 "observe "

1:10 "record interval 4"

1:20 "observe"

1:30 "record 5"

1:40 "observe"

1:50 "record 6"

2:00 "observe subject one"

2:10 "record interval 7"

2:20 "observe"

2:30 "record 8"

2:40 "observe"

2:50 "record 9"

3:00 "observe one"

3:10 "record interval 10"

3:20 "observe"

3:30 "record 11"

3:40 "observe"

3:50 "record 12"; **"locate subject TWO"**

4:00 "observe subject two"

4:10 "record interval 13"

4:20 "observe"

4:30 "record 14"

4:40 "observe"

4:50 "record 15"

And so on... until 48 intervals (one page at 16:00). REPEAT this sequence of 48 intervals and place them END TO END for additional minutes.

Put only the "observe/record cues" on the tape, not the class time (e.g., elapsed 4:20). When making a tape, be in a quiet room and very cautious for at least 16 consecutive minutes!

SOFIT OBSERVER TRAINING DVD

A DVD has been produced to help train reliable SOFIT observers and to enable data comparisons across different studies:

McKenzie, T. L. (2009, March). *System for Observing Fitness Instruction Time (SOFIT): Introduction and Coding Lessons*. (93 minute DVD). San Diego State University, San Diego, California. (T. McKenzie, writer, producer, narrator; D. Graves, editor)

The DVD has four segments:

Segment One (15 min) introduces SOFIT and provides examples for the three main categories: student activity, lesson context, and teacher behavior.

Segment Two (14 min) presents clips for coding while receiving immediate feedback on the screen.

Segment Three (19 min) is designed for observers to practice coding quickly. Answers to these clips from two lessons are presented below.

Segment Four (45 min) shows clips from four sample lessons. Answers to these will be provided by Dr. McKenzie to certified trainers only. This procedure permits observers within projects to be compared to a “gold standard” and to be assessed over time.

Active Living Research helped support the production of this DVD and will make it available free to interested researchers for a limited time. See the ALR website for additional information on how to receive it:

Active Living Research
San Diego State University
3900 Fifth Avenue, Suite 310
San Diego, CA 92103
www.activelivingresearch.org

The following two pages present the ‘gold standard’ codes for the lessons in Segment Three of the DVD.

DVD Segment 3, Lesson 1

	Student Activity	Lesson Context	Teacher Interaction	Clarification (e.g., skill prompts, start prompts such as “go,” and calling cadence= in-class PA prompts)
1	4	S	I	tossing, catching skills
2	4	S	N	
3	3	K	N	
4	4	M	N	
5	5	S	I	Working on locomotor and manipulative skills
6	5	S	I	
7	5	S	I	
8	4	K	N	Small step at end
9	5	G	I	
10	5	G	N	
11	5	G	I	
12	4	G	N	
13	5	G	I	
14	4	G	N	
15	3	G	N	Whistle to stop activity, but next context unknown
16	5	G	I	
17	5	G	I	
18	5	G	N	
19	3	M	N	Game stopped; changing taggers
20	3	K	N	
21	5	G	I	
22	5	G	I	
23	5	G	N	
24	3	M	N	
25	3	M	N	

DVD Segment 3; Lesson 2

	Student Activity	Lesson Context	Teacher Interaction	Clarification (e.g., skill prompts, start prompts such as “go,” and calling cadence= in-class PA prompts)
1	5	M	N	
2	5	F	I	
3	5	F	I	
4	5	F	I	
5	4	F	I	
6	3	F	I	
7	3	M	N	
8	5	S	I	
9	3	S	I	
10	2	K	N	Code upward (lying down, plus)
11	2	M	N	Code upward (lying down, plus)
12	3	M	N	
13	3	S	I	
14	3	S	I	“Make a bridge”
15	4	S	I	Skill prompt
16	4	S	I	Calling cadence
17	5	S	I	
18	5	S	I	Calling cadence
19	4	G	I	Dance performance w/ music
20	2	M	I	T praises performance/engagement
21	3	M	N	
22	3	M	N	
23	4	S	I	
24	3	S	N	
25	3	S	I	
26	3	K	N	“right” reinforces a verbal response, not PA.
27	4	S	I	
28	4	S	I	
29	2	K	N	
30	2	G	I	
31	5	G	I	
32	2	G	I	T ‘hearts go’= prompt for PA