



**CLOUDEE:**

Child Leadership Observation for  
Understanding Developmental  
Episodes and Engagement

Manual and Example Protocol

Dzewaltowski & Colleagues (2015)

## I. CLOUDEE THEORETICAL BACKGROUND

### Organizational Developmental Settings as an Eco-behavioral System

Organizational developmental settings are the places children spend their time throughout the day. These settings include home, childcare, school, after school programs, youth clubs, and youth sport, as well as other places that children go on a regular basis. We use the term developmental settings because child development is the result of a child interacting with his or her environment over time in a place. As children interact with their environments, the result of their interaction is both immediate behavior and longer term development. Children develop or change over time and these developmental changes are largely the result of sustained interaction within developmental settings on a weekly basis. These developmental settings have also been described as delivery settings, because settings provide the social structure and context for planning, implementing, and evaluating interventions (Green et al., 1999).

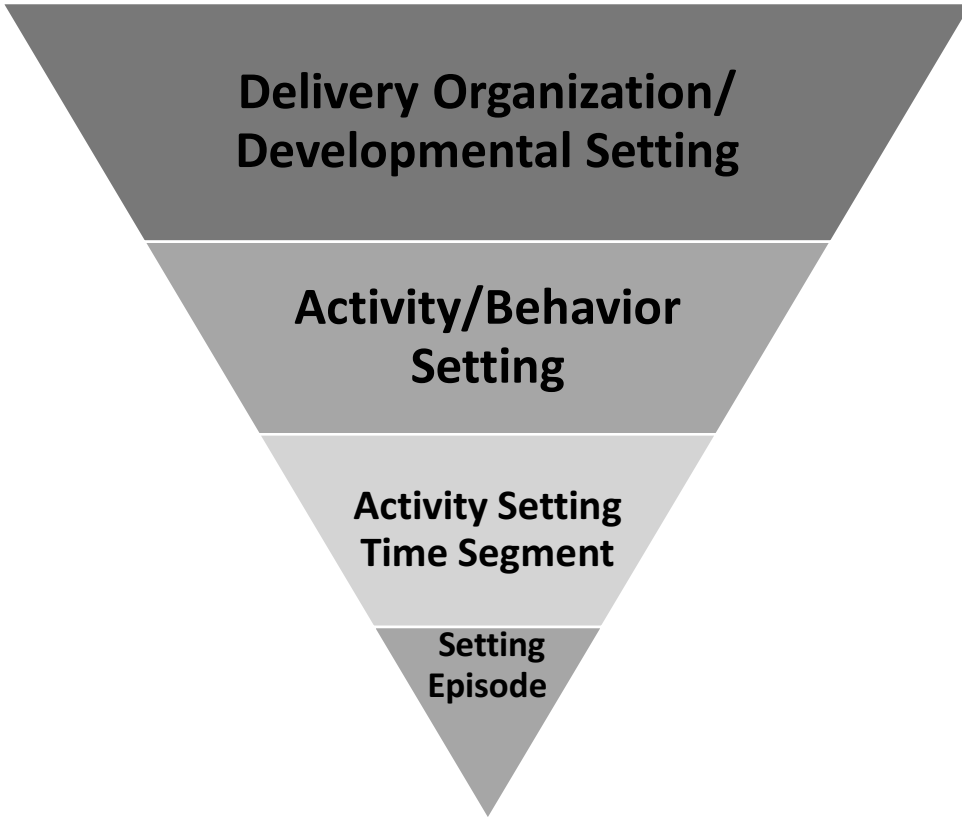
To measure the natural eco-behavioral system, the goal of the investigator is to transduce the activity into a record of the natural ecological system (Dzewaltowski et al. in preparation; Barker, 1968; Gump, 1967; 1974). Placement of behavior into investigator defined categories may lose the structure of the eco-behavioral system. To define the natural eco-behavioral system, the investigator goal is to identify the boundaries of the system in terms of physical location and time. The boundary is naturally self-generated; it changes as the system changes. The people within the eco-behavioral unit are to a degree interchangeable and replaceable. Teachers come and go. Students come and go. However, the same eco-behavioral system continues to function because reproduced social practices create an interdependence of parts within the system.

CLOUDEE (Child Leadership Observation for Understanding Development Episodes and Engagement) is a complete tool for assessing child organizational development settings by providing a comprehensive collection of data regarding students' activity levels based on the social conditions with which they interact. Each day a child passes through various organizational delivery settings, or locations for physical activity promotion that includes the target audience. These delivery settings can be further broken down by organizational routines into a hierarchy of components. **Figure 1** depicts how within a delivery setting there can be multiple behavior settings. For example, within a school there is classrooms, a playground, and a lunch room. An organizational behavior setting has nested behavior setting time segments (class sessions); and lastly, behavior setting has smaller time segments, episodes, that make up a behavior setting time segment. **Table 1** provides definitions of each level of the hierarchy.

**Table 1 - Variable and definition of different levels of the behavioral eco-system**

| Variable                 | Definition  | Citation                                |
|--------------------------|---|---|
| Delivery setting         | A location for physical activity promotion that includes the target audience and is bounded in space and time to provide the social structure and context for planning, implementing, and evaluating interventions (Green et al., 1999)   | Dzewaltowski (2008)                     |
| Behavior setting         | A behavior setting is an eco-behavioral unit of the synchrony among social and physical environment where youth behavior occurs (Barker, 1968). It is a natural unit of organized action. The behavior setting is characterized by a standing pattern of behavior anchored to a physical environment, a degree of interdependence among the parts, and degree of independence from the behavior settings that are external to it. | Dzewaltowski (2008)                     |
| Behavior setting segment | A part of the start and stop time of a behavior setting. Not an eco-behavioral unit. This could be a 10 min or 30 min observation period, before lunch, recess, after lunch. The segment groups the episodes for convenience. Note, this definition is not consistent with Gump's use of the term segment.  | Dzewaltowski et al. (under development) |

|                          |  |   |
|--------------------------|--|---|
| Behavior setting episode | A smaller eco-behavioral unit nested within a behavior setting that has a location and clearly defined naturally occurring <i>start</i> and <i>stop</i> point. A change in episode occurs if there is a change in the location, the physical environment or objects, the format of the standard pattern of behavior or program of action, the concern, or the population distribution of participants. | Dzewaltowski et al. (under development) |
|--------------------------|--|---|



**Figure 1: The hierarchy of organization of the developmental settings in which children spend their time throughout the day.**

## **II. OBSERVATION OF THE ECO-BEHAVIORAL SYSTEM AS EXPERIMENTAL UNITS**

### ***Behavioral Settings (Classroom level of analysis)***

We distinguish a delivery setting from a behavior setting. The term behavior setting has been used for any type of setting in some of the literature. A behavior setting is an eco-behavioral unit of the synchrony among social and physical environment where youth behavior occurs (Barker, 1968). It is a natural unit of organized action. The behavior setting is characterized by a standing pattern of behavior anchored to a physical environment, a degree of interdependence among the parts, and degree of independence from the behavior settings that are external to it. Within an organization delivery setting, there may be many behavior settings.

A behavior setting must include one or more standing patterns of behavior. The behavior setting consists of standard patterns of behavior-and-physical milieu (natural and built environments and objects). The physical milieu surrounds the standard pattern of behavior without temporal break (doors open at 8:00 and close at 6:00). The physical milieu is synomorphic to the behavior (e.g. the boundary of a football field is the boundary of the game). The physical milieu also fits with the behavior and is not independently arranged. The parts of a behavior setting (physical milieu and behavior) are called synomorphs. A synomorph is a phenomenon with

both behavior-and-circumjacent physical milieu. The synomorph (standing pattern of behavior in physical environment) have a degree of interdependence with other synomorph (e.g. gym physical activity and snack cannot exist in the same space and time). Lastly, the synomorphs have greater degree of interdependence among themselves than with parts of other behavior settings. For example, a childcare delivery setting may not be a behavior setting because the activity of separate classrooms are so independent in their functioning that, by the criteria used, they are discrete behavior settings. There is also an external dynamic criterion. That is that if changes to one behavior setting are influencing a change in another setting, dynamically they are not independent.

### ***Tests for Defining a Behavior Setting (Barker, 1968)***

- 1) Structural test
  - a) Is there a standing pattern of behavior anchored to a specific physical milieu (natural and build environment and objects)?
  - b) Is the parts of the behavior-physical milieu synomorph?
    - i) The criterion serves to exclude as behavior settings such discriminable features such as social norms, customs, social classes, ethnicity, geographical areas, legal codes, educational systems.
- 2) Internal dynamic test
  - a) Does the behavior-milieu have a degree of interdependence?
    - i) If any of the parts are too independent, then it constitutes separate behavior settings. The child development organization delivery settings (e.g., after-school programs, youth clubs, youth sport) often have behavior-milieu structure with multiple behavior settings (synomorphs).
- 3) External dynamic test
  - a) Does the behavior-milieu have a degree of independence or dynamic separation from behavior settings that are structurally external to it?
    - i) This test is applied to settings that meet 1 and 2. That is a classroom behavior setting may include a group time area, a dramatic play area, a snack area, and a recreation area.
  - b) Are these separate behavior settings or independent behavior settings?
    - i) It may be that these areas are so structurally interdependent that they should be considered one behavior setting. It is likely that the playground, for example, is a separate behavior setting.

### ***Behavior Setting Time Segment***

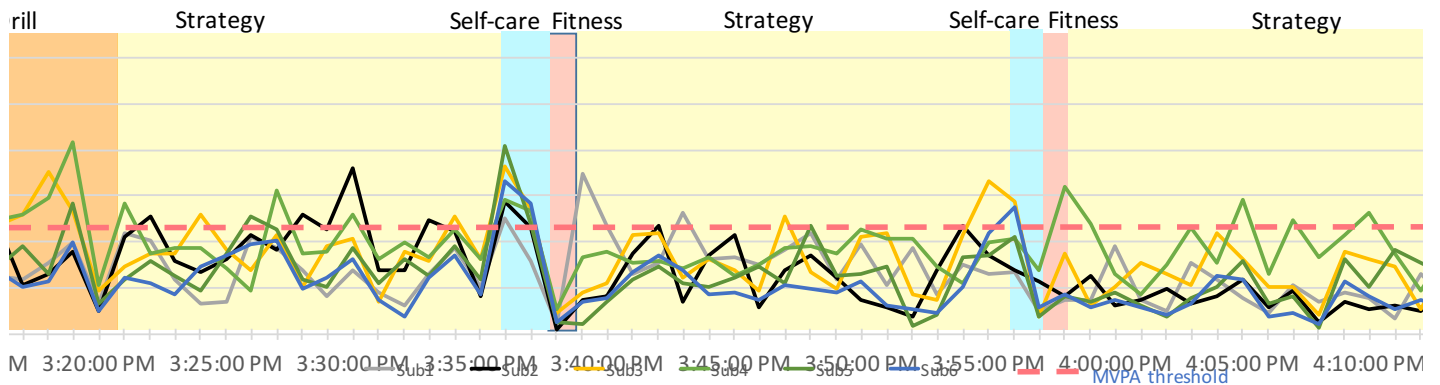
A behavior setting time segment is part of the start and stop time of a behavior setting and not an eco-behavioral unit. For example, this could be 10 seconds, 10 minutes or 30 minutes of an observation period, before lunch, recess, or after lunch. The segment groups behavior for convenience of the investigator.

### ***Behavior Setting Episode Boundaries***

Setting episodes are smaller eco-behavioral units nested within behavior settings. Gump (1967; 1974) labeled these units segments. We have adopted the term episode to recognize the self-contained nature of the eco-behavioral unit. It is not a part or a segment of the larger behavior setting. It is nested within or an episode of the behavior setting. Furthermore, classroom episodes occur in sequence and sometimes parallel to each other throughout the day (Gump, 1982).

Below is an example of a youth sport practice with 7 children. (See Figure 2) The practice was segmented by observation following the CLOUDE coding rules. The time period is a natural system where the conditions for human behavior are consistent. The time period is a patch of stable environmental conditions. The organization behavioral setting dynamically changes through a period of time moving through differ types of patches of environmental conditions we call episodes. Throughout practice children wore accelerometers and the counts from the accelerometers is displayed over time. An episode is a segmented time period that can be defined, labeled according to environmental conditions, modeled as an experimental unit with an estimate for outcomes such as youth physical activity mean and variance.

**Figure 2: Youth Sport Episode Example (Data from Schlechter et al., 2016)**



### III. EXAMPLE DATA COLLECTION PROTOCOL

Before data collection begins develop a protocol to follow for all portions of data collection. This can ensure uniformity among multiple research assistants and save time during the data analysis process. The examples provided in this document were used in the CLOUDEE Observation studies under review.

#### ***Child Care Classroom Study***

1. Selection of center and classroom into study
  - a. 10 3-5 year old classrooms
  - b. 10 family child care homes
2. Teacher informed parental consent
  - a. One hour teacher training on data collection
  - b. Obtain informed consent teachers and descriptive questionnaire
  - c. Child care centers provided with \$60 per teacher
  - d. Teachers will be provided with information about their teacher-child interactions.
3. Child Informed Parental Consent
  - a. Obtain classroom student list
  - b. Provide student consent form checklist
  - c. Student consent forms and parent demographic survey
  - d. Envelop to put consent forms in
  - e. Research Assistant support if necessary.
4. Obtain Student Demographic Information
  - a. Student records access for those with informed consent
    - i. age, gender, ethnicity, free and reduced lunch status, special needs status, attendance
5. Schedule Classroom Observation
  - a. Obtain class schedule
6. Schedule Group Time
  - a. Before first observation day
7. Classroom observation (Randomly select 2 days; T, W or Th, F)
  - a. Set-up classroom camera, plug into wall
    - i. Exclude first 30 minutes of day to eliminate child care arrival time.
      1. (Hamre et al., 2009; CLASS Implementation Guide)
  - b. Turn on classroom camera at 8:00
  - c. Turn on iPod Touch and attach wide angle lens (Click Swivl App, Hit Record, Insert into Tune Belt)
    - i. Turn off after one hour.
  - d. End observation (Classroom camera) after noon meal (12:30-1:00)
  - e. Turn off classroom camera, return iPod 1 to Kit for storage until data can be downloaded.
8. Outdoor observation (Select same 2 days as in class observation)
  - a. Research Assistant

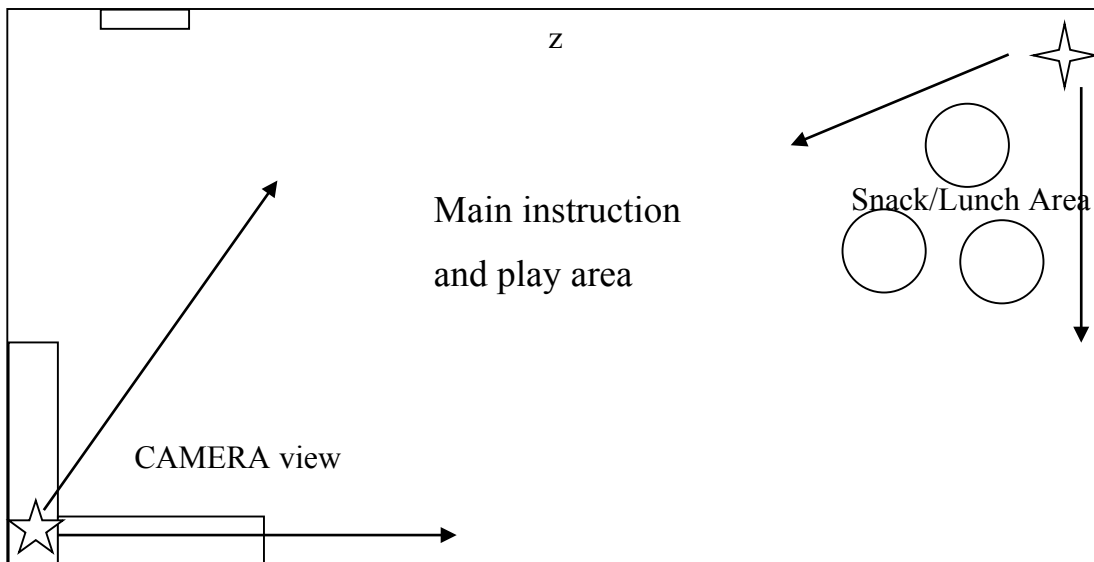
- i. 1 morning session (45 min)
    - 1. Two camera observation (belt, wearable camera)
  - ii. 1 afternoon session (45 min)
    - 1. Two camera Observation (belt, wearable camera)
  - iii. Download observations and recharge cameras
9. Data Management
- a. Research Assistant checks that previous day observation was downloaded.

**Camera Placement Protocol**

Before leaving for data collection, make sure all iPods have the correct time, are fully charged, and videos from the previous day have been downloaded and deleted from iPod.

**Classroom Camera 1**

1. Position opposite of main instruction area, if possible (see Figure 1).
2. Use the same iPod for CAMERA for all recordings, iPod 5.
3. Plug in CAMERA to an outlet in the room.
  - a. If an outlet is not available in the left corner of the room, move CAMERA to the right corner of the room, opposite the main instructing area.
  - b. Instruct all teachers in the classroom and adjoining classroom to leave the CAMERA plugged in at all times.
4. Attach CAMERA microphone to the microphone lanyard or teacher's shirt and turn on.
5. Research Assistants turn the camera on by 8:00 am.
6. Have a phone with the international time clock (in hours/mins/secs) available to be recorded at the beginning of the video (this will provide a reference of accurate time on the iPod video). Record around 5 seconds of this on the iPod.
7. Recording has now begun.
8. Research assistant will return after lunch time (~12:30pm) to ensure the CAMERA has stopped recording and will bring CAMERA's iPod back to the lab to be downloaded.
9. CAMERA can be left in the classroom overnight so it is ready for the following day.
- 10.



**Figure 3**

**Classroom Camera 2**

1. Place camera in a location which captures the entire classroom, make sure meal time will be captured.
2. Ensure the camera docking station is turned on, and plug iPod into the wall.
3. Remove iPod 2 and wide angle lens from Kit 1.
4. Turn all settings (including WiFi) off and display screen brightness to "Low" to save battery life.

5. Wipe iPod camera clean.
6. Assemble wide angle lens as pictured in Figure 3.
7. Wipe wide angle lens clean to make sure there are no smudges.
8. Hold iPod 2 in landscape mode and open Swivl App.
9. Set the video recording size to “Large” and make sure all other settings are correct Make sure the video is recording using the back iPod camera.
10. While still in landscape mode, place iPod in Swivl dock and connect adaptor to iPod.
11. Turn on mic and sync mic with Swivl base before giving it to the teacher to wear.
12. Research assistant will press record
13. Have a phone with the international time clock (in hours/mins/secs) available to be recorded at the beginning of the video (this will provide a reference of accurate time on the iPod video). Record around 5 seconds of this on the iPod.
14. Swivl should start recording at 8:30am.
15. Research assistant will stop Swivl recording after lunch time.

### **Wearable Camera Belt iPod**

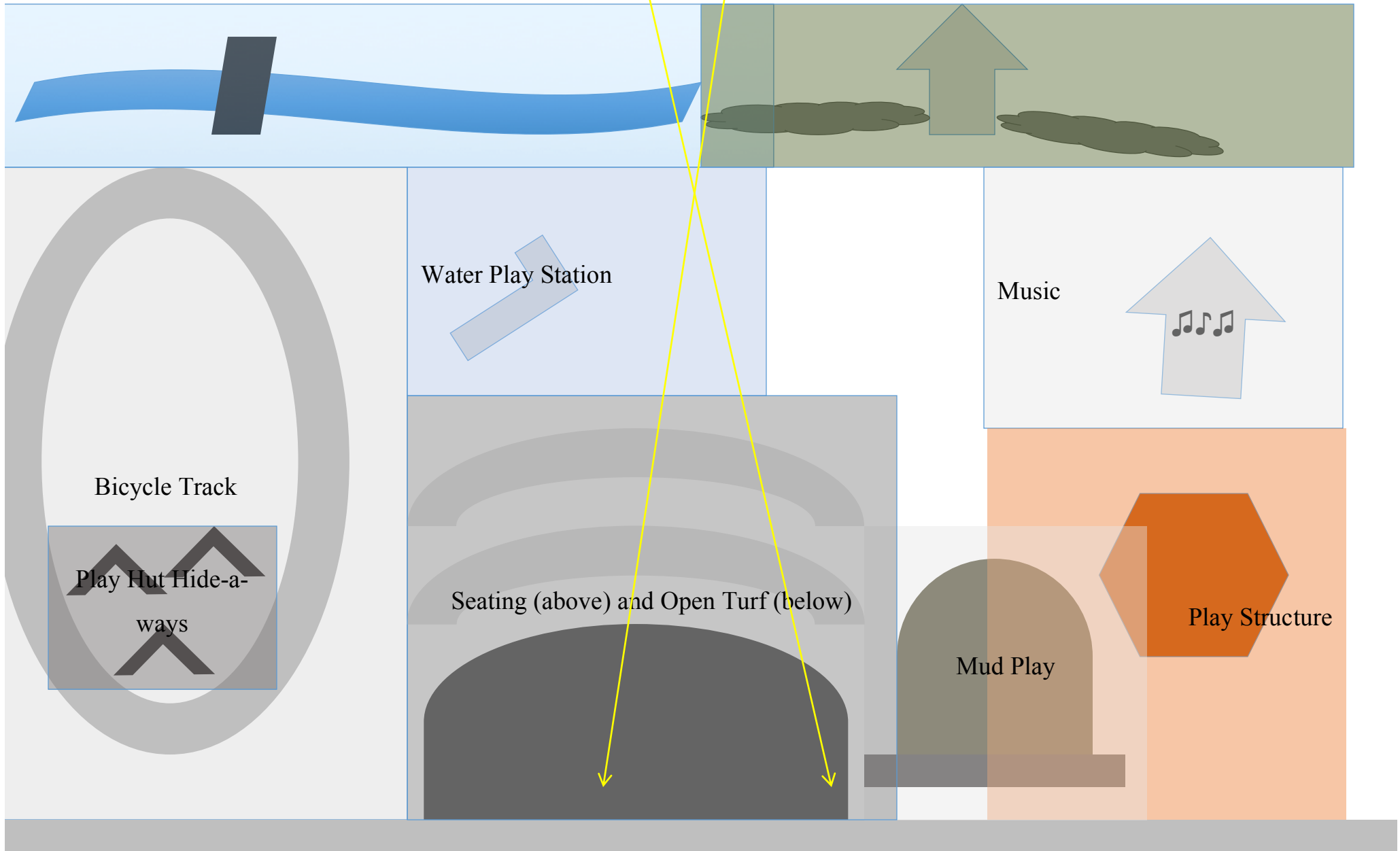
1. Remove tune belt, wide angle lens, and iPod 1 from Kit 1.
2. Locate iPod settings and set display screen brightness to “Low.”
3. Wipe iPod camera lens clean.
4. Assemble wide angle lens (smaller lens) as illustrated below (see Figure 2, steps 1-3).
  - a. **Be sure that the lens is screwed on tightly and that corner piece is secure.**
5. Open iPod camera app.
6. Change from camera mode to video mode by swiping right
7. Hold iPod in **landscape mode** with screen facing in, camera in top left corner.
8. Push “record”
9. Have a phone with the international time clock (in hours/mins/secs) available to be recorded at the beginning of the video (this will provide a reference of accurate time on the iPod video). Record around 5 seconds of this on the iPod.
10. Insert iPod 1 into tune belt (see step 4 in Figure 2).
11. Wipe the wide angle lens clean to make sure there are no smudges.
12. After iPod is inserted, check to make sure the video is still recording.
13. Place tune belt around the waist and fasten. **Tighten belt.** Camera should be facing forwards and should be level – as perpendicular to the ground as possible.
14. Teacher may remove belt after wearing for one hour of interactive time and give to research assistant or place back in Kit 1.
15. Research assistant will assemble iPod 4 following the same protocol and insert into the second belt for the morning recess session.
16. The lead teacher will press record and wear iPod 4 with wide angle lens for the duration session.
17. Afternoon Research assistants will collect cameras and return iPod 4 for charging.
18. Research assistant will give the belt with iPod 4 and wide angle lens to the teacher for outdoor afternoon recess.
19. Before the class goes outdoors for afternoon recess, teacher will press record and place tune belt on the waist and wear for the duration of the session.

### **Outdoor Camera**

1. Place Swivl in a location which captures the entire playground.
2. Ensure the Swivl docking station is turned on.
3. Remove iPod 3 and wide angle lens from Kit 2.
4. Turn all settings (including WiFi) off and display screen brightness to “Low” to save battery life.
5. Wipe iPod camera clean.
6. Assemble wide angle lens as pictured in Figure 3.
7. Wipe wide angle lens clean to make sure there are no smudges.
8. Hold iPod 3 in landscape mode and open Swivl App.
9. Set the video recording size to “Large” and make sure all other settings are correct (see Figure 2)
10. Make sure the video is recording using the back iPod camera.

11. Have a phone with the international time clock (in hours/mins/secs) available to be recorded at the beginning of the video (this will provide a reference of accurate time on the iPod video). Record around 5 seconds of this on the iPod.
12. While still in landscape mode, place iPod in Swivl dock and connect adaptor to iPod.
13. Turn on mic and sync mic with Swivl base before giving it to the teacher to wear.
14. Research assistant will push record at the beginning of outdoor morning session facing half of the playground. See the map (Figure 3) to see the camera placement.
15. After half of the outdoor time switch the camera over to the other side of the playground by swiveling the tripod.
16. Return camera and iPod 3 to the lab for charging.
17. Charge iPod 3 after first outdoor morning session so that it has full battery for outdoor afternoon session.
18. Repeat steps 1-10 for outdoor afternoon session.

here with two different camera angles  
(marked by yellow arrows) to capture all  
settings of the playground



## ***Example Observation Task Protocols***

### **Mondays**

1. Arrive at site by 9:00am to collect consent forms.
2. Find Deb to introduce you to lead teacher whose classroom will be observed on Tuesday.
3. Ask lead teacher when they prefer to hold group time with their classroom and schedule a time.
  - a. This allows us to introduce camera to children and lead teacher.
4. After a time is scheduled, return to the lab to gather materials.
5. Return back to the CDC classroom at scheduled time.
  - a. Bring Camera 1, Camera 1, and tune belt.
6. Ask the lead instructor how they would like to structure group time.
7. Set up Duo in the classroom, plug in, turn on system, connect microphone (mic should be off).
8. Show children the Camera 1, Camera 2, Swivl, and iPod.
9. Gather the children together and take a class picture using the iPod.
10. Walk teacher through what they should expect during observation days using the Teacher Instruction Checklist form
11. After group time, leave camera in the classroom (still plugged in and turned on), return back to lab with all other materials.

### **Wednesdays**

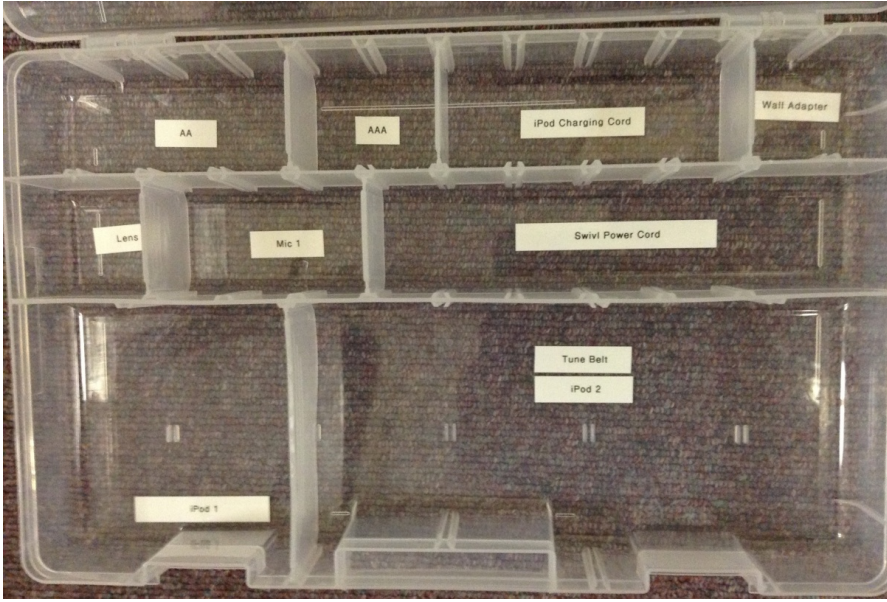
1. After setting up cameras in Classroom 1 on Wednesday, morning research assistants should locate lead teacher of Classroom 2.
2. Schedule a group time for Wednesday afternoon with Classroom 2.
3. Morning research assistants should communicate the scheduled time with afternoon research assistants.
4. After lunch, afternoon research assistants will move CAMERA from Classroom 1 to Classroom 2.
5. Bring EVE and a tune belt to classroom 2.
6. Right before scheduled group time, ask lead teacher how they would like to structure the session.
7. Set up CAMERA in the classroom, plug in, turn on system, connect microphone (mic should be off).
8. Show children the CAMERA, Swivl, and iPod.
9. Gather the children together and take a class picture using the iPod.
10. Walk teacher through what they should expect during observation days using the Teacher Instruction Checklist form.
11. After group time, leave CAMERA in the classroom, return back to lab with all other materials.

## ***Example Materials and Storage Checklist***

Following each data collection session, all iPods should be charged. Equipment should be stored as pictured below in the appropriate kit. All equipment should be returned back to the closet by the sign in sheet.

- Swivl docking stations (3)
- Tripods (2)
- K-State Dziewaltowski Lab Kits (2)
  - Batteries (AA, AAA)
  - iPod charging cord (3)
  - Wall adapter (1)
  - Wide angle lens (2)
  - Swivl microphone (2)
  - Swivl power cord (2)

- iPod Touch (3)
- Tune belts (2)
- Classroom checklists for teachers
- Classroom checklists for research assistants



#### IV. EXAMPLE DATA ENTRY PROTOCOL

**Download videos immediately after returning to the lab.**

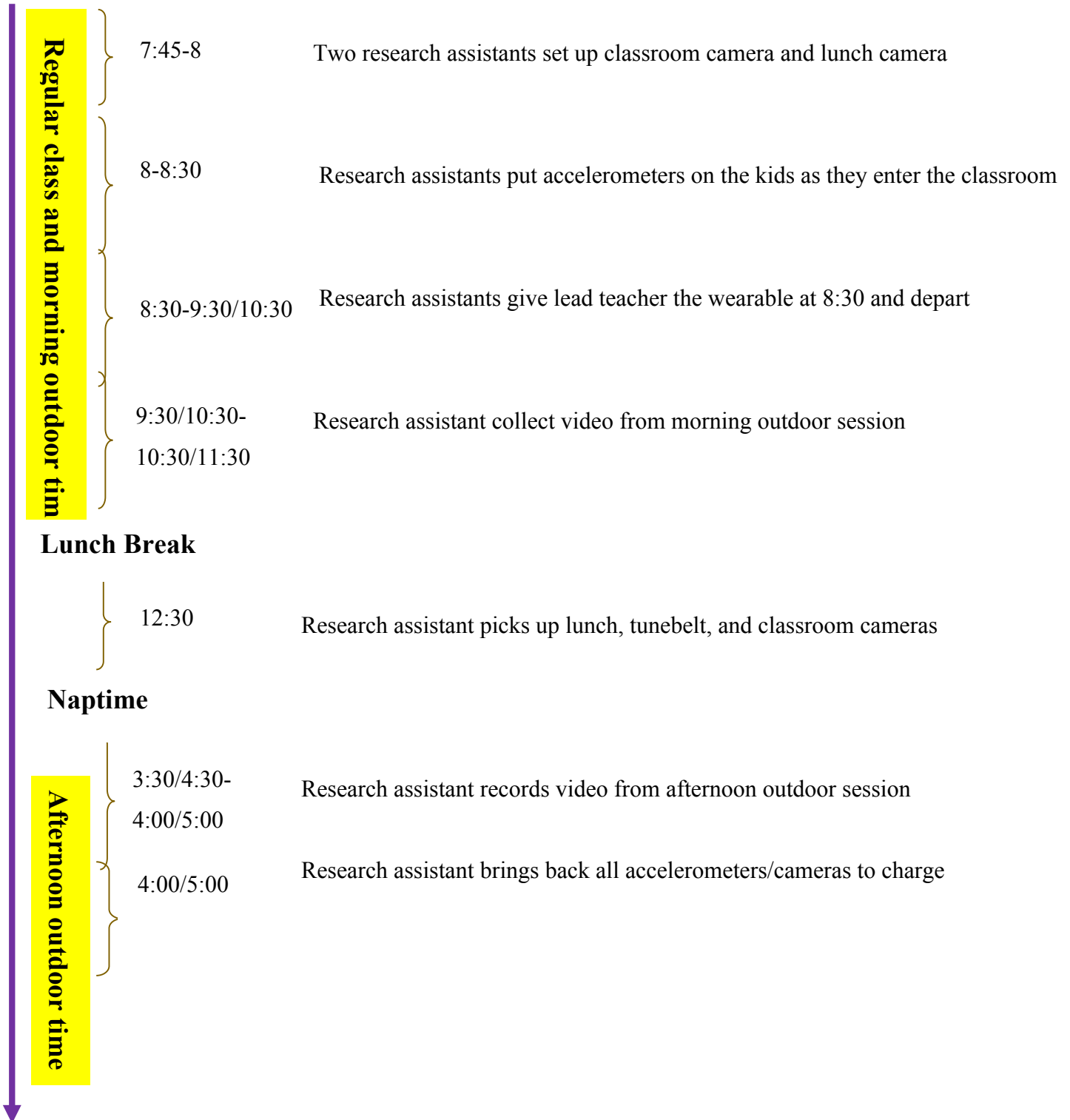
1. The following steps should be taken to download the data:  
Click “Go” and then “Connect to Server” – server address will already be entered
2. Enter name (users\1ypnml) and password (Wildcats2013) and click “Connect”
3. Bring materials from the morning session or afternoon session to the Mac workstation
4. Launch iTunes
5. Connect iPod (one at a time)
6. In iTunes, at the top of the window locate the device, ex: “K-State Dzewaltowski 1”
7. Click on the device
8. In the top row, click on “Apps”
9. In the far right side of the screen, highlight the second App window (see picture).
10. Scroll down and click “Swivl” under the “File Sharing” category
11. Under “Swivl Documents” click the video file
12. Record video start time, end time, iPod #, and video duration in the format hh:mm:ss in the Video Log document (see example)
13. Click “Save to”
14. Save file to the server address smp://dokvs.users.campus/vs\$ in the project folder Video Collection with Accelerometers
15. With in this folder place video files in the proper week and classroom name folders
16. Find recently uploaded files and rename using the following formulas:



| <b>Table 2</b>   |  |
|--|--|
| <b>Morning</b>   | <b>Afternoon</b>   |
| <p><b><u>CAMERA Camera:</u></b><br/>Teacher’s last name_Date_duo.mov<br/>Ex: Smith_6-5-13_duo.mov</p>  | <p><b><u>Afternoon EVE Outdoor Swivl:</u></b><br/>Teacher’s last name_Date_PM_EVE.mov<br/>Ex: Smith_6-5-13_PM_EVE.mov</p>            |
| <p><b><u>Tune belt morning iPod (classroom):</u></b><br/>Teacher’s last name_Date_belt_classroom.mov<br/>Ex: Smith_6-5-13_belt_classroom.mov</p> | <p><b><u>Tune belt afternoon iPod:</u></b><br/>Teacher’s last name_Date_belt_outside2.mov<br/>Ex: Smith_6-5-13_belt_outside2.mov</p> |
| <p><b><u>Tune belt morning iPod – (outdoor):</u></b><br/>Teacher’s last name_Date_belt_outside1.mov<br/>Ex: Smith_6-5-13_belt_outside1.mov</p>   |  |
| <p><b><u>Morning Camera Outdoor Swivl:</u></b><br/>Teacher’s last name_Date_AM_EVE.mov<br/>Ex: Smith_6-5-13_AM_EVE.mov</p>                       | <p>**Replace Teacher Last name with ID number once ID numbers have been assigned</p>   |

## Example Timeline

Provide a timeline of what a typical data collection day will look like. Also provide a task checklist specifying which research assistants will be responsible for each task.



## V. EXAMPLE DATA REDUCTION

After video has been collected, begin analyzing data by utilizing the CLOUDEE coding scheme in the Noldus Observer XT 11.5 Software. The Observer XT software was developed to collect and analyze observational data. It allows the user to qualitatively and quantitatively describe behavior from video observation.

### **Example CLOUDEE Episode Decision Rules**

A change in any of the five categories of location, object, format, concern, or participant indicates an episode change. Table 2 lists the five categories and provides operational definitions for the codes that will be utilized in the Observer XT CLOUDEE coding scheme.

**Table 3 - CLOUDEE Example Child Care Episode Decision Rules**

| Variable       | Definition   | Code   |
|----------------|--|--|
| Location       | The spatial location. An episode occurs someplace.   | <ul style="list-style-type: none"> <li>• Location not identified               <ul style="list-style-type: none"> <li>a. Unable to determine from video</li> </ul> </li> <li>• Indoors</li> <li>• Outdoors</li> </ul>  |
| Object         | Change in equipment or resources used.   | <ul style="list-style-type: none"> <li>• Not identified               <ul style="list-style-type: none"> <li>a. Unable to determine from video</li> </ul> </li> <li>• None               <ul style="list-style-type: none"> <li>a. No equipment or props available</li> </ul> </li> <li>• Equipment or props available               <ul style="list-style-type: none"> <li>a. Equipment or props such as jump ropes, blocks, computers, etc are available</li> </ul> </li> <li>• Resources available</li> </ul>   |
| Format-Pattern | Changing in patterns for arranging participants (e.g. small group vs. whole group; Doyle, 2006).                                   | <ul style="list-style-type: none"> <li>• Not identified</li> <li>• Activity centers               <ul style="list-style-type: none"> <li>a. Physical space divided into several learning or activity areas. Child has a choice to choose any area to play in. Examples include such as the large block area, the manipulative center with puzzles and small connecting blocks or materials, sociodramatic play areas such as grocery store or kitchen, and a book or writing center (OSRAC-P).</li> </ul> </li> <li>• Stations               <ul style="list-style-type: none"> <li>a. Places where students work on different tasks simultaneously and then rotate through them to learn and develop specific content/skills/fitness. Students do not have free choice to change stations until instructed to do so by the teacher.</li> </ul> </li> <li>• Small group with adult (2-4)</li> <li>• Small group without adult</li> <li>• Whole group with adult (5-9+)</li> <li>• Whole group without adult</li> </ul> |
| Format-Role    | Change in roles and responsibilities for carrying out events (teacher led, child led; oral answering versus writing; Doyle, 2006). | <ul style="list-style-type: none"> <li>• Not identified</li> <li>• Format – none</li> <li>• Didactic individual               <ul style="list-style-type: none"> <li>a. Teacher lectures, gives instructions, models, asks close-ended questions, or demonstrates, such as counting or saying the days of the week” (Chien et al., 2010) within an episode,</li> </ul> </li> </ul>   |

|         |                             |   |
|---------|-----------------------------|---|
|         |                             | <p>the teacher's primary focus is on one individual or one group of individuals</p> <ul style="list-style-type: none"> <li>• Didactic system           <ul style="list-style-type: none"> <li>Teacher lectures, gives instructions, models, asks close-ended questions, or demonstrates, such as counting or saying the days of the week (Chien et al., 2010). Within an episode, the teacher interacts with multiple individuals or groups of individuals</li> </ul> </li> <li>• Scaffolding individual           <ul style="list-style-type: none"> <li>a. Teacher does one-on-one work with child and builds on child's initiations, using visuals, concrete objects, and gestures to help child learn. Teacher elicits responses and helps child expand his or her thoughts (Chien et al., 2010). Within an episode, the teacher's primary focus is on one individual or one group of individuals</li> </ul> </li> <li>• Scaffolding system           <ul style="list-style-type: none"> <li>a. Teacher does one-on-one work with child and builds on child's initiations, using visuals, concrete objects, and gestures to help child learn. Teacher elicits responses and helps child expand his or her thoughts (Chien et al., 2010). Within an episode, the teacher interacts with multiple individuals or groups of individuals.</li> </ul> </li> </ul>  |
| Concern | Change in content of focus. | <ul style="list-style-type: none"> <li>• Not identified</li> <li>• Free Play           <ul style="list-style-type: none"> <li>a. Refers to free play time during which adult influence of task choice is not intended. This time resembles recess during which students may select to participate or not.</li> </ul> </li> <li>• Physical Activity           <ul style="list-style-type: none"> <li>a. Game Play               <ul style="list-style-type: none"> <li>i. Adult led time devoted to playground games where skills are not directly applicable to a competitive sport game and there is no adult instruction and feedback targeting the goal of skill development (Parker, 1989; Siedentop, Tousignant, &amp; Parker, 1982).</li> </ul> </li> <li>b. Motor Skill Practice               <ul style="list-style-type: none"> <li>i. Adult led activity time devoted to practice of skills with the primary goal of skill development (e.g. passing drills in volleyball, exploring movement forms, and practice dribbling a basketball, dance steps, or a skill on balance beam) (Parker, 1989; Siedentop, Tousignant, &amp; Parker, 1982).</li> </ul> </li> <li>c. Scrimmage/Routine               <ul style="list-style-type: none"> <li>i. Adult led time devoted to the refinement and extension of skills in a game like setting and during which there is frequent instruction and feedback (Parker, 1989; Siedentop, Tousignant, &amp; Parker, 1982).</li> </ul> </li> </ul> </li> </ul> |

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- d. Sport Game
    - i. Adult led activity time devoted to the application of skills in a game or competitive setting when participants generally perform without major intervention from the adult (Parker, 1989; Siedentop, Tousignant, & Parker, 1982).
  - e. Fitness
    - i. Activity time devoted to activities whose major purpose is to alter the physical stat of the individual in terms of cardiovascular endurance, strength, or flexibility. This includes calisthenics, distance running, weight training, agility training, and fitness testing (Parker, 1989; Siedentop, Tousignant, & Parker, 1982).
  - f. Dance
  - g. Warm-up
    - i. Time devoted to routine execution of physical activity who purpose is to prepare the individual for engaging in further activity but not designed to alter the state of the individual on a long-term basis (Parker, 1989; Siedentop, Tousignant, & Parker, 1982).
  - h. Cool-down
    - i. Time devoted to routine execution of physical activity who purpose is to prepare the individual for less physically intense activity but not designed to alter the state of the individual on a long-term basis (Parker, 1989; Siedentop, Tousignant, & Parker, 1982).
  - Concepts
    - a. PA Techniques, rules, strategy
      - i. Time devoted to transmitting information about the physical form of a motor skill, rules, and strategy (Parker, 1989; Siedentop, Tousignant, & Parker, 1982).
    - b. PA Knowledge
      - i. Time devoted to transmitting information related to physical fitness concepts, including endurance, strength, and flexibility (Parker, 1989; Siedentop, Tousignant, & Parker, 1982).
    - c. Cognitive Concepts
      - i. Time devoted to transmitting information about a subject matter such as literacy, history, or general concepts that require conscious intellectual activities such as thinking, reasoning, and remembering.
    - d. Social Concepts
      - i. Time devoted to transmitting information about appropriate and inappropriate
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ways of behaving within the context of the activity.

- e. Nutrition
  - i. Time devoted to transmitting information about appropriate and inappropriate ways of healthful eating.
- Food
  - a. Eating
  - b. Food preparation
  - c. Gardening
- Management
  - a. Transition
    - i. Time spent when the class is transitioning from one activity to the next (e.g. kids taking of their shoes, going to the bathroom, and going to circle time after clean-up at their own pace).
  - b. Waiting
    - i. Time spent waiting for the next teacher instruction or prompt for next episode (e.g. kids waiting at a table while teacher prepares food for lunch).
  - c. Time Out
  - d. Organization
    - i. Time allocated to managerial and organization activities, or time devoted to class business that is unrelated to instructional activity (e.g. circle time).

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|             |   |  |
|-------------|---|--|
| Participant | Substantive changes in population distribution that influences the system (e.g. basketball requires 5 players (equilibrium), 4 creates demand (demand); 6 creates overload(overload). | <ul style="list-style-type: none"><li>• Not identified</li><li>• Demand</li><li>• Equilibrium</li><li>• Overload</li></ul> |
|-------------|---|--|

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**Table 4 - Example youth sport coding scheme, definitions, and examples for each contextual variable.**

| <b>Code</b>    | <b>Definition</b>  | <b>Example</b>   |
|----------------|--|--|
| <b>Task</b>    | <b>The purpose of the episode.</b>   |  |
| Warm-up        | Time devoted to a routine execution of physical activity with a purpose to prepare the individual for engaging in further activity, but not designed to alter the skill or fitness of the individual on a long-term basis. Usually occurs in the beginning of practice. [18] | At the beginning of practice the coach has kids do a series of dynamic warmups and stretches as a group (high knees, lunges, butt kicks, etc.)         |
| Free play      | Time during which adult influence of task choice is not intended [17].   | The coach has footballs for the kids to play with at the beginning of practice but does not tell the kids what activities to do or not to do.          |
| Fitness        | Time where major purpose is to alter the physical state in terms of cardiovascular endurance, strength or flexibility [17, 24]].   | Running sprints  |
| Sport Skill    | Adult-led activity time devoted to practice of skills with the primary goal of skill development [17, 23-25].  | Passing drills, flag grabbing drills   |
| Game play      | Adult-led time devoted to playground games where skills are not directly applicable to a competitive sport game and there is little to no adult instruction or feedback [23-25].   | Tag, sharks and minnows  |
| Scrimmage      | Adult-led activity time devoted to the refinement and extension of skills in a sport game where two opposing teams are created within a team. Minimal interference from the coach [18, 23-25].   | Within a team, the kids are playing a mock football game   |
| Strategy       | Time devoted to transmitting information related to skills, rules, and strategy of the sport [23-25].  | Putting in or practicing an offensive play, defensive system, etc.   |
| Management     | Time allocated to managerial and organization activities, time devoted to team business that is unrelated to instructional activity [23-25].   | Time out, opening huddle, closing huddle   |
| Self-care      | Time devoted to washing, using the rest room, or drinking water  | Water break  |
| <b>Pattern</b> | <b>The arrangement of the participants within an episode.</b>  |  |
| Solitary       | Child is doing activity alone [18, 23-25].   | During a dribbling drill, the child is practice by him or her self.  |
| One v One      | Child is doing activity with only one additional participant [18].   | During a blocking drill, each child has a partner and they take turn blocking.   |
| Small group    | Child is performing an activity with greater than one other child, but less than the full team [18].   | During a receiving drill, the full team is split into two groups. Each group has their own drill to complete, and the groups are not working together. |
| Whole group    | All children are participating in an activity [17,18, 23-25].  | All kids go to water break at the same time.   |

| Participant Demand | Population distribution that influences the system   |   |
|--------------------|--|---|
| Optimal            | Time period when there are an equal number of opportunities to participate as children to participate [14].            | During tag all 7 kids are playing at the same time, during warm-up all the kids are on the line at the same time  |
| Disadvantaged      | Time period when there are a fewer number of opportunities to participate than children available to participate [14]. | During tag, if you get tagged you have to sit on the sideline until all of the children are out. During a passing drill, only 1 child is receiving the pass at a time, the rest are waiting in line behind him. |