

# Exploring the Pedagogical Content Knowledge of Effective Teachers in Physical Education



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## Pedagogical Content Knowledge

Shulman's Definition (1986, p. 9):

Pedagogical content knowledge (PCK) is *"the ways of representing and formulating the subject matter that makes it comprehensible to others"*

- PCK is blending of content knowledge and pedagogical knowledge
- Regular and repeated teaching
- Students conceptions and misconceptions

PCK has been widely referenced and used in the educational community (Bullough, 2001; Loughran et al., 2001)



## Literature on PCK in Physical Education

- In PE and in the general education, examination of PCK was mostly descriptive in nature
- In PE - 25 studies were conducted
  - Field observations and interviews
  - Preservice, novice and experienced teachers (E.g., McCaughtry, 2004; Schempp et al., 1998; Tsangaridou, 2002)
  - Mostly a description of characteristics of instruction but not the relations among those components
  - Resulted in high inference conclusions
  - Recommendations for PETE programs on what one ought to do instead of what one SHOULD do



## Conclusions from the Literature Review

- The PE literature is still at the descriptive phase of inquiry despite a call for experimental investigation of PCK (Rovegno, 1992)
- Absence of functional definition of PCK and the conditions under which PCK develops
- After 20 years, there is still great uncertainty as to what PCK really is (Loughran et al., 2001, 2003) although PCK today is “almost taken for granted as though representing common sense” (Bollough, 2001, p. 657)



## Significance of the Problem



Is PCK observable?

Can PCK be measured??

Appropriateness of PCK???

*The absence of a functional definition of PCK poses a significant problem in discussing and using PCK in research and in practice*



## First Purpose of the Study

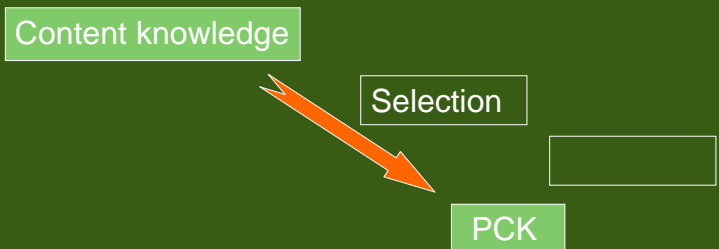
1. To test a modified definition of PCK





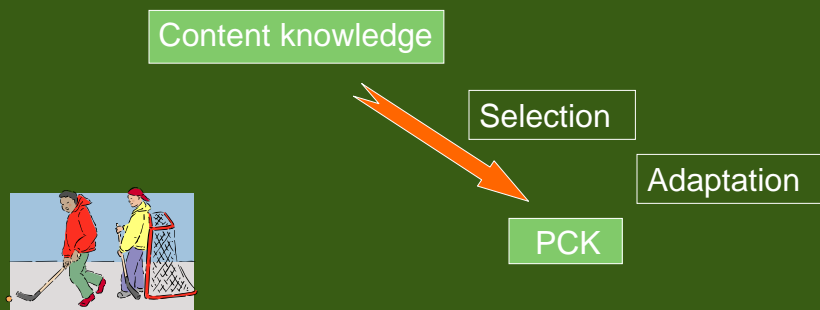
## PCK – A Modified Operational Definition

PCK is the act of **selecting** content from one's knowledge base for the purpose of teaching in a specific context (Ward et al., 2006)



## Selecting Content for Teaching

- Lesson plans
- Enactment of content in teaching
- Repeated interactions with the same content





## Recap – A Modified Definition of PCK

PCK is....

Present definition:

*“the ways of representing and formulating the subject matter that makes it comprehensible to others” (Shulman, 1986)*

Proposed definition:

the act of **selecting** content from one’s knowledge base for the purpose of teaching in a specific context (Ward et al., 2006)



## The Proposed Definition Holds True for:

- Preservice teachers
- Novice teachers
- More experienced teachers
- Expert teachers

What is the difference between those teachers relative to PCK??



## PCK as a Continuum

Immature  
PCK

Mature  
PCK

- Preservice versus experienced teacher
- PCK is Content specific
  - Basketball versus Lacrosse
  - Beginners versus college athletes



## Second Purpose of the Study

2. To examine how does the PCK of effective teachers differ in the teaching of their strong and less strong units of instruction?





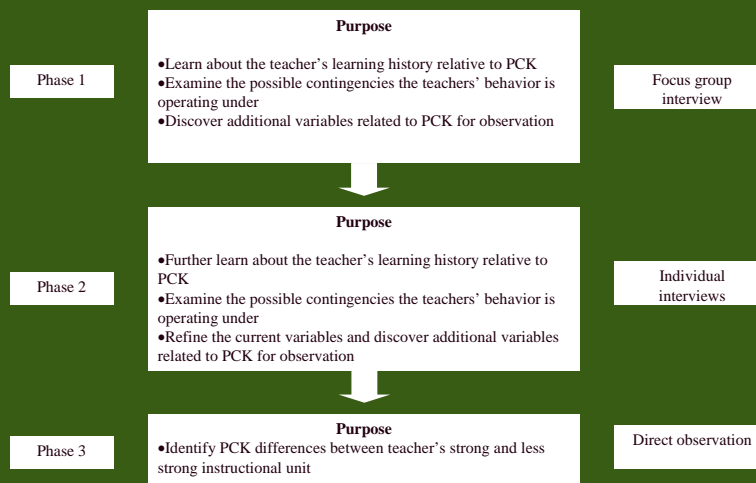
## Pedagogical Content Knowledge From a Behavioral Perspective

- The evidence for knowing is in the possession of behaviors (Skinner, 1974)
  - What does it mean to know how to write?
  - Observing teacher's practices could be an indication of their PCK
- Behaviors are occasioned by an environmental stimulus (Skinner, 1953, 1974)



## Phases of This Descriptive Study

**How does the PCK of effective teachers differ in the teaching of their strong and less strong units of instruction?**



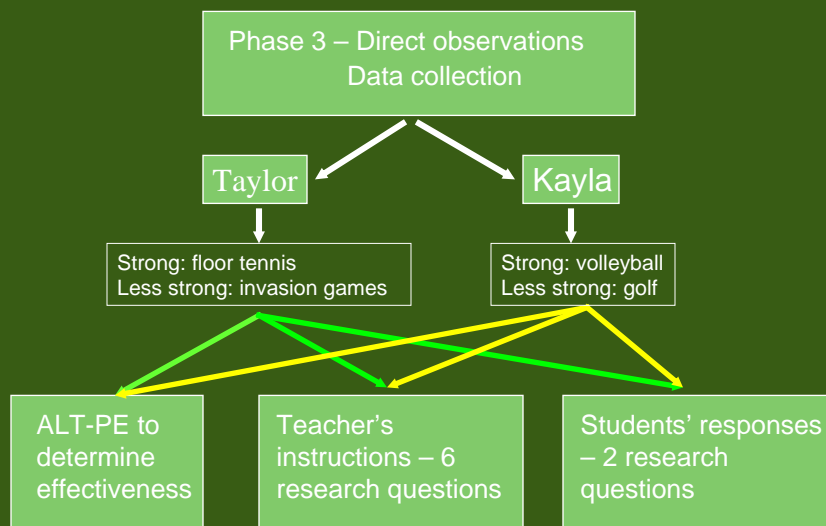


## Sub Research Questions – Phases 1 & 2

1. How do teachers describe how they acquire their CK and PCK relative to their strong and less strong units?
2. What teaching practices do teachers identify as their PCK?
3. How do teachers ensure the content delivered is appropriate to the students' developmental level?



## Phase 3





## Sub Research Questions Phase 3 – Teacher's Instructions

1. What was the percentage of each type of content task used in the teacher's strong and less strong unit of instruction?
  - a. In what order were the types of tasks presented in the strong and less strong instructional units?
2. Which instructional forms were used by the teachers to represent the content to the students?
3. How many tasks were provided to the class, to a small group and to the individual student?
4. What type of cues were used by the teachers to represent the content?
  - a. How many times were those types of cues used during the lesson and unit?
5. Which antecedents precede teacher's presentation of the task to an individual student?
6. What types of adaptations (from the initial tasks provided) were made by the teachers to enhance students' performance?
  - a. How many adaptations were made?

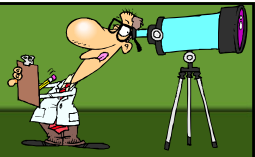


## Sub Research Questions Phase 3 – Students' Responses

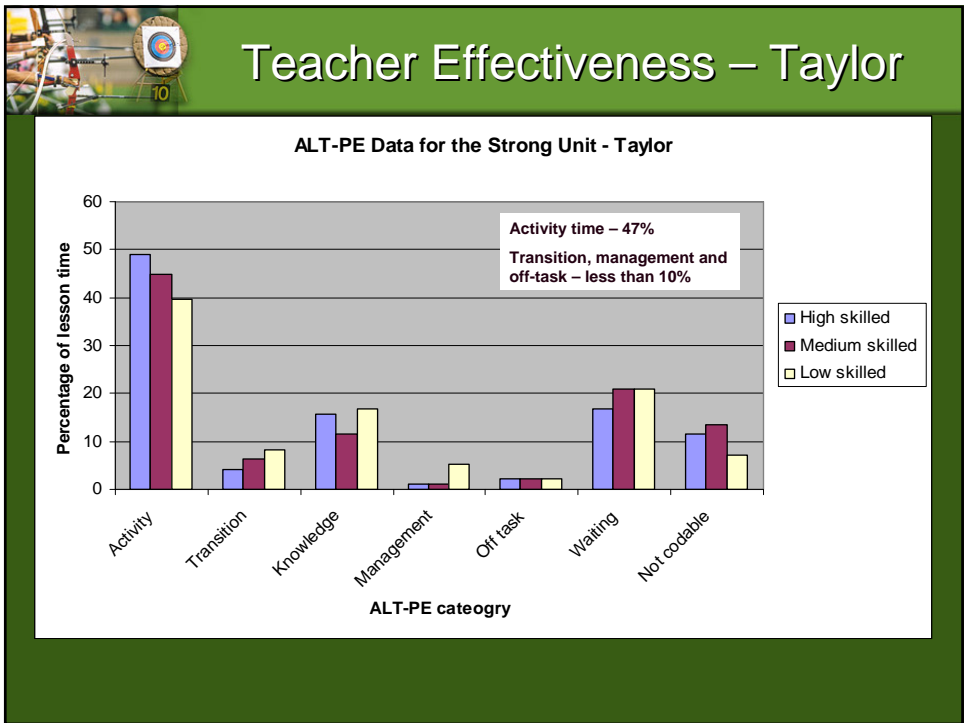
7. What percentage of the students performed the teacher's task correctly?
8. To what extent were the adaptations made for individual students appropriate?



# Methods

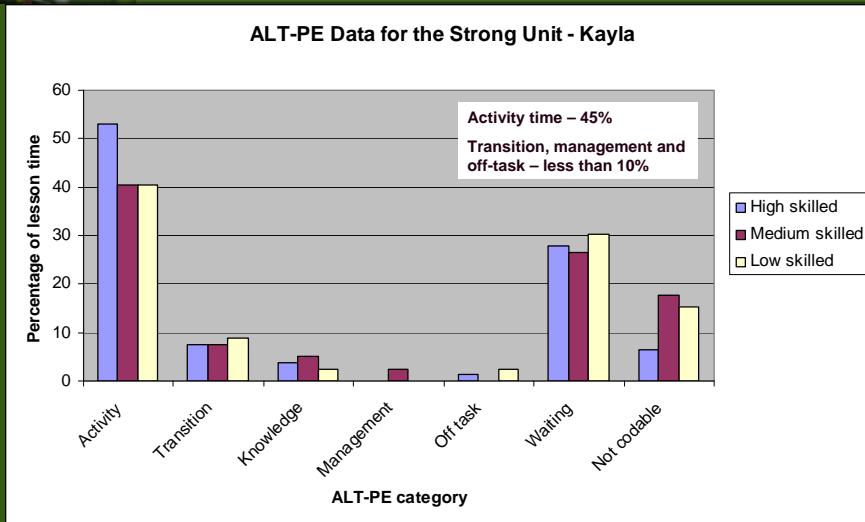


- Direct observation on teacher's behaviors and students' response.
- The following dependent variables were collected:
  - *Type of content tasks*: Informing, extension, refinement, application
  - *Instructional forms*: verbal, demonstrations, metaphors
  - *Recipient of tasks*: class, small group, individual
  - Types of cues: technical, metaphorical, visual
  - *Antecedents for adaptation task*: correct, incorrect, off-task, other
  - *Types of adaptations*: modifying task complexity, extending the task, breaking/refining the task, assigning a different task, competitive conditions, restating the task, and change of position
  - *Performance of the whole class*: correct, incorrect, other
  - *Appropriate of adaptation*: appropriate, inappropriate, no opportunity to respond





## Teacher Effectiveness – Kayla



**Conclusion: teachers were effective as indicated by ALT-PE data and as supported by Metzler (1989).**

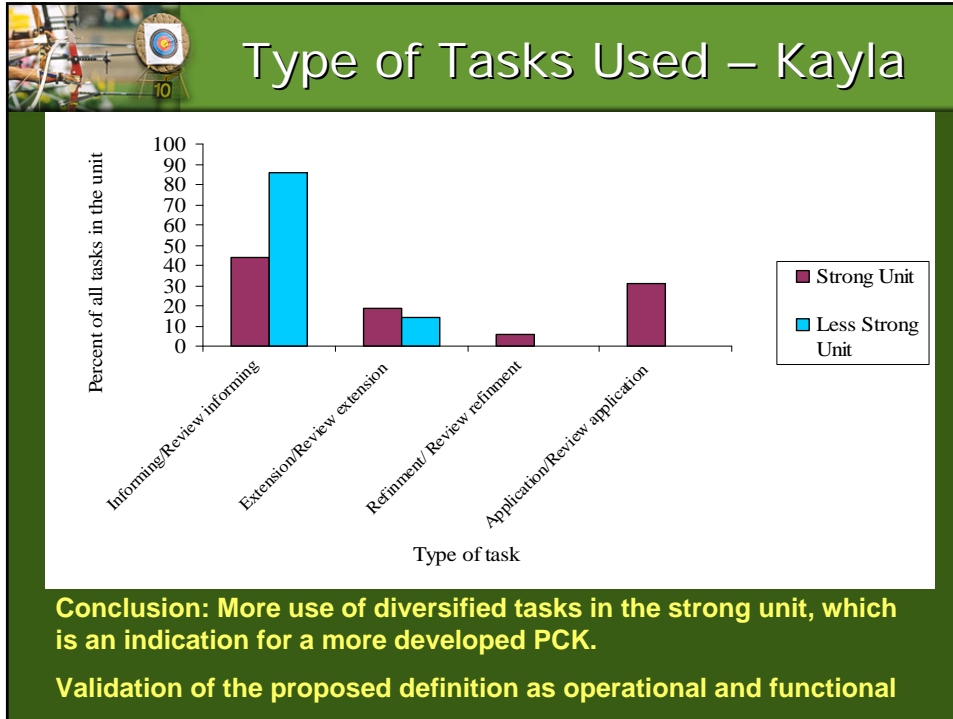


## Teacher's Instructions Dependent Measures

1. *What was the percentage of each type of content task used in the teacher's strong and less strong unit of instruction?*

Type of content tasks (Rink, 2006):

- Informing – the initial task in the progression of a skill
- Extension – a task that increases the level of difficulty of a previous task. Extension tasks forms progressions.
- Refinement – a task that focuses on the quality of performance
- Application – a task that assesses the form or the use of a movement



**Teacher's Instructions Dependent Measures (cont')**

4. *What type of cues were used by the teachers to represent the content?*

- Types of cues (Kutame, 1997)
  - Technical cue- emphasizes a technical characteristic of the skill to be performed (e.g., elbow up)
  - Metaphorical cue- communicates the critical elements using characteristics of another subject (e.g., tic toc like a clock, pancake catch)
  - Visual cue- object or aids used to occasion correct response (e.g., tape on the floor)



## Average Cues per Lesson– Kayla

Average number of types of cues used per lesson/ Instructional unit	Strong unit – Average (range)	Less strong unit – Average (range)
Technical	<b>27</b> (20-24)	13 (10-17)
Visual	<b>8</b> (5-11)	6 (5-8)
Metaphorical	1 (0-2)	<b>4</b> (1-6)

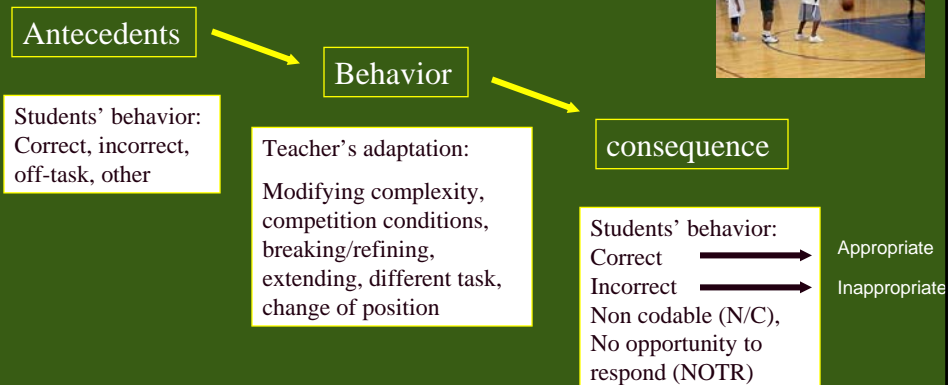
**Conclusion: More depth of technical cues in the strong unit which indicates on more developed CK and PCK**

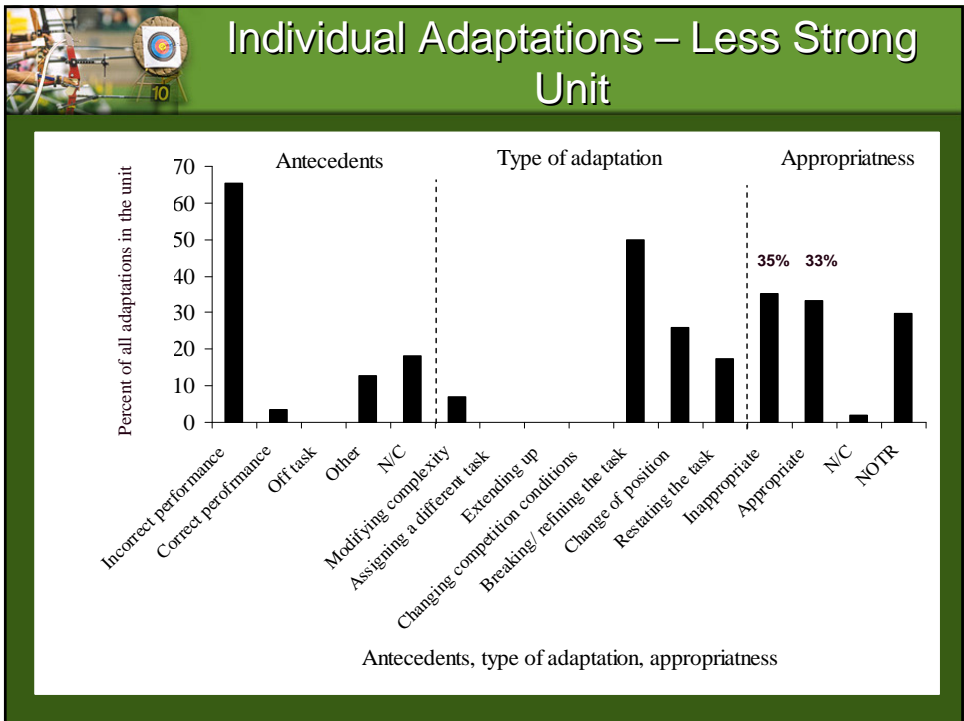
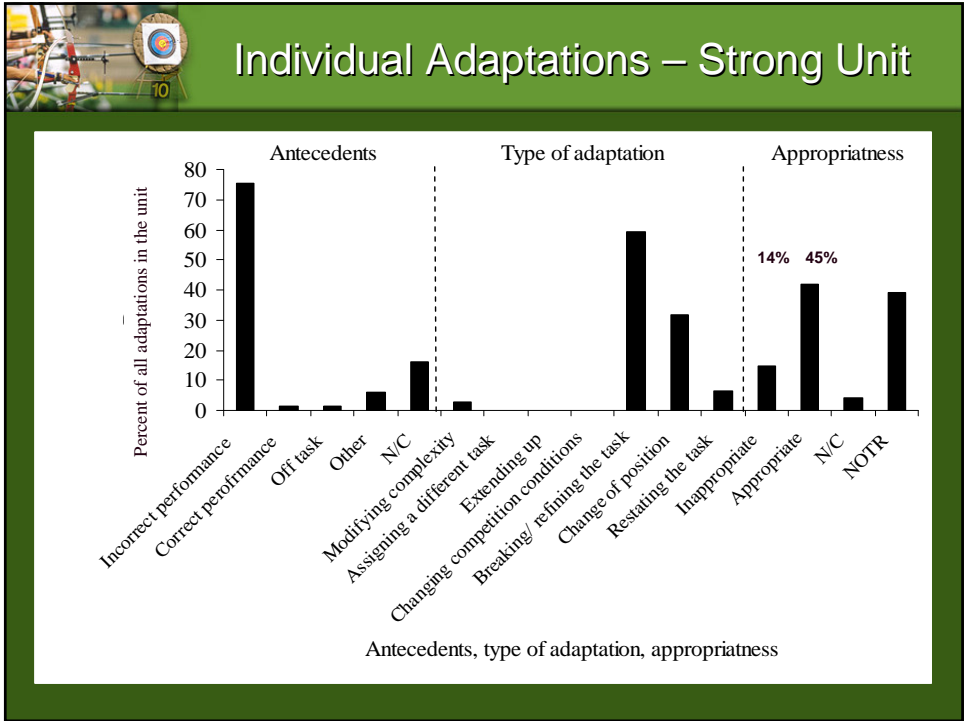
**Further validation of the proposed PCK definition**



## Teacher-Individual Student Interactions

- Research questions 5, 6, 8 centered on how teachers adapt tasks, and how the individual student respond
- *Functional analysis* of the teacher's behavior







## Conclusions From Teacher-Individual Student Interactions

*Antecedents:* the teacher mostly approached the students when they are incorrect. Indicates on ability to discriminate errors, which is a form of CK (Ward, 2005).

*Adaptations:* no differences in PCK as indicated by the types of adaptations the teacher assigns for individual students

*Appropriateness:* 45% of adaptations were appropriate in the strong unit, only 14% inappropriate. In the less strong unit, 33% was appropriate, and 35% were inappropriate.

1. Appropriate adaptations more prevalent in the strong unit
2. Inappropriate adaptations more prevalent in the less strong unit

This is evidence for more developed and mature PCK in the strong unit



## Conceptual Considerations Conclusions

- Validation of the operational definition of PCK
  - Inclusive and non limiting
  - Operational - Enables researchers to include or exclude variables as indicators for PCK
  - Functional - allowed the selection of a set of variables that are observable and measurable
- Those variables, based on the definition, are possible indicators for the existence and developmental level of PCK
- Clarifying the relation between CK and PCK
- Validation of the notion that PCK develops on a continuum
  - Differences were found between the PCK demonstrated in the strong and less strong unit
    - More diversified tasks in the strong content
    - Richer CK and more mature PCK as measured by the use of cues
    - Better ability to appropriately adapt tasks and to tailor to students' characteristics in the strong unit – indication for more developed PCK



## Methodological Considerations Conclusions and Recommendations

- Challenges with the delivery of tasks:
  - Task delivery
    - Ambiguous tasks
    - Lack of accountability
    - Appropriateness of tasks

Future research:

- To validate the present findings
- Extending the current investigation to:
  - Other content areas
  - Secondary school teachers



## Implications and Recommendations for PETE Programs

- PETE programs and cooperating teachers are important for teachers' professional development
- More depth of CK and progressions for teaching the subject matter
- Develop candidates' ability to self-instruct and seek for resources
- Skill analysis classes for developing ability to discriminate performance
- Teach how to deliver adequate and explicit tasks



## Its Time to Thank...



- My advisor: Dr. Phillip Ward
- The teachers who agreed to participate in this study
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